IEc

ECONOMIC ANALYSIS OF CRITICAL HABITAT DESIGNATION FOR THE MARBLED MURRELET

Draft Economic Analysis | April 20, 2007

prepared for:

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EXECUTIVE SUMMARY

1. The purpose of this report is to identify and analyze the potential economic impacts associated with the proposed critical habitat designation for the marbled murrelet (*Brachyramphus marmoratus marmoratus*) (hereafter, "murrelet"). This report was prepared by Industrial Economics, Incorporated (IEc), under contract to the U.S. Fish and Wildlife Service (Service).

2. On September 12, 2006, the Service published a proposed critical habitat designation for the murrelet.[1] The proposed critical habitat included 222,000 acres proposed for final critical habitat designation and 3.38 million acres proposed for exclusion from critical habitat according to section 4(b)(2) of the Act (collectively referred in this analysis as the "study area"). The study area of this analysis therefore comprises 3.6 million acres of land in Washington, Oregon, and California. The study area is subdivided into 14 units. In order to provide results of the economic analysis at a more refined geographic scale than the 14 units, this analysis identifies "subunits" by landowner type.[2]

3. The economic impacts of the critical habitat designation are estimated separately for each of the two categories of land identified in the proposed rule: 1) areas proposed for final critical habitat and 2) areas proposed for exclusion from critical habitat according to section 4(b)(2) of the Act. Section 3 of this report summarizes impacts for lands in the latter category, while the majority of the research effort for this analysis focuses on describing and quantifying impacts of murrelet conservation in the areas proposed for final critical habitat.

4. The study area lands are generally characterized as old-growth forest stands containing large-sized trees. Of the areas proposed for final critical habitat designation, approximately 85 percent are State-owned lands, primarily managed by the Oregon Department of Forestry and the California Department of Parks and Recreation. Another 13 percent of the area is owned by private commercial entities (primarily timber companies) and residential landowners. The remaining two percent of lands are owned by counties and conservation groups. Of the lands proposed for exclusion according to section 4(b)(2) of the Act, approximately 85 percent are Federal and 15 percent are State lands. Exhibit ES-1 and the Key Findings highlighted below summarize the results of the economic analysis.

[1] U.S. Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Marbled Murrelet; Proposed Rule, 71 FR 176, September 12, 2006.

[2] A graphical depiction of these subunits is presented in Exhibits 2-3 through 2-16, and information on their relative sizes is described in Exhibits 2-1 and 2-2.

EXHIBIT ES-1 SUMMARY OF POST-DESIGNATION IMPACTS (2007 - 2026), 2007$

IMPACT	UNDISCOUNTED	3% DISCOUNT RATE	7% DISCOUNT RATE
Areas Proposed for Final Critical Habitat Designation			
Total Economic Impacts	$69.4 million - $1.42 billion	$38.1 million - $535 million	$24.2 million - $251 million
Annualized Impacts	-	$2.22 million - $16.8 million	$2.18 million - $12.0 million
Areas Proposed for Exclusion from Critical Habitat Under Section 4(b)(2) of the Act			
Total Economic Impacts	$1.21 billion	$435 million	$203 million
Annualized Impacts	-	$14.2 million	$14.3 million

5. This analysis describes economic impacts of murrelet conservation efforts associated with the following land uses: 1) timber management; 2) development, 3) recreation, 4) other land use activities, including transportation and mining, and 5) administrative costs associated with section 7 consultation.

6. The predominant land use across the areas proposed for final critical habitat is silviculture. Accordingly, the majority (between 70 and 94 percent depending on the scenario and discount rate assumed) of the forecast impacts are associated with impacts to silvicultural activities, primarily losses in land values associated with precluding timber harvest in murrelet habitat. Approximately 123,000 acres included in the areas proposed for final critical habitat (56 percent) are currently managed for timber harvest. The remaining area is predominantly owned by California Department of Parks and Recreation and is managed for conservation or recreation. The largest land holders that actively manage for timber are: the Oregon Department of Forestry (81,310 acres), Weyerhaeuser (9,760 acres), and Big Creek Lumber Co. (6,116 Acres). Together, these three landowners account for 78 percent of the timber ownership in the areas proposed for final critical habitat.

KEY FINDINGS

Total Post-designation Impacts: The draft economic analysis forecasts post-designation impacts associated with murrelet conservation efforts in areas proposed for final critical habitat to be $69.4 million to $1.42 billion (undiscounted dollars) over the next 20 years. The present value of these impacts, applying a three percent discount rate, is $38.1 million to $535 million ($2.22 million to $16.8 million annualized); or $24.2 million to $251 million, using a seven percent discount rate ($2.18 million to $12.0 million annualized).

Quantified Impacts: Timber-related impacts comprise the greatest percentage, 94 percent at the high end (undiscounted dollars), of the total quantified impacts in areas proposed for final critical habitat designation. Development-related impacts comprise another four percent, and recreation the remaining two percent, of the high end undiscounted impacts in areas proposed for final critical habitat.

- Timber management: Timber impacts are estimated according to two scenarios bounding the uncertainty associated with future murrelet conservation strategies in these areas. Under Scenario 1, impacts to timber activities are $63.3 million in undiscounted dollars ($33.4 million present value at three percent, or $20.8 million present value at seven percent). Impacts result from the implementation of ongoing murrelet conservation efforts, such as surveying and monitoring, and setting particular parcels aside from timber harvest for the purposes of murrelet conservation. Under Scenario 2, impacts include Scenario 1 impacts, and further assume that all timber harvest is precluded. Impacts under Scenario 2 therefore add decreases in land value associated with restricting future economic use of the land. Scenario 2 impacts are $1.34 billion in undiscounted dollars ($454 million present value of three percent, or $178 million present value at seven percent).[3]
- Development: Impacts to development are also forecast according to two scenarios. Low-end Scenario 1 assumes murrelet conservation does not affect development activities because development may be possible at low densities without cutting trees and/or the murrelet may not occupy a specific parcel slated for development. Scenario 2 assumes that forecast development will involve cutting occupied murrelet stands, and therefore such development will be precluded. Scenario 2 impacts are decreased land values associated with removing the option for future development. Present value impacts according to Scenario 2 are $59.8 million.[4]
- Recreation: Total impacts of murrelet conservation on recreation activities is forecast to range from $2.0 million to $23.1 million (undiscounted); this represents a present value impact of $1.55 million to $17.5 million applying a three percent discount rate, or $1.17 million to $12.9 million applying a seven percent discount rate. Impacts at the low end include the costs of surveying, monitoring, and refuse management; impacts at the high end also include lost consumer surplus associated with prohibiting the development of new recreation trails within the study area.
- Other land use activities: Transportation, mining, and fire management are listed as threats to the murrelet. Because of the rural, forested nature of the areas proposed for final critical habitat, however, there are few existing roads and mines, and no future road or mining projects are forecast within the timeframe of the analysis. Section 7 of this report highlights the distribution of existing roads, mines, and fire management areas within the study area.
- Administrative costs: Administrative costs associated with section 7 consultations in areas proposed for final critical habitat are forecast to be $4.16 million in undiscounted dollars ($3.1 million assuming a discount rate of three percent or $2.2 million assuming a rate of seven percent)

Critical Habitat Subunit with Highest Impacts: At the high-end, the subunit with the largest projected impacts (in undiscounted dollars) is the Oregon Department of Forestry subunit in Unit 4. Impacts in this subunit constitute between 38 and 46 percent of the total high-end impacts depending on the discount rate applied (see Exhibit). Unit 4 is the largest unit proposed for final critical habitat, accounting for roughly 56 percent of all of the active timberlands. The relative ranking of the remaining unit varies slightly by management assumption (low or high end impact estimates) and discount rate applied (see Exhibits ES-4 to ES-6).

Areas proposed for exclusion according to section 4(b)(2): Total undiscounted impacts in areas proposed for exclusion according to section 4(b)(2) of the Act are forecast at $1.21 billion, or a per acre impact of $358. The present value impact applying a three percent discount rate is $435 million or $203 million applying a seven percent discount rate. These impacts are estimated based on the decreased value of the actively-managed timberlands associated with restrictions on harvest, and surveying and monitoring for the species; these aggregated impacts are spread across all acres to which the efforts apply.

[3] Per guidance from the Department of the Interior, this analysis discounts impacts applying zero (undiscounted), three, and seven percent discount rates. To approximate impacts on land values, however, the value of all future timber harvest is calculated in perpetuity. This method does not allow for the calculation on an "undiscounted" impact, as that would be the annual lost timber harvest divided by the discount rate; dividing by a discount rate of zero to estimate "undiscounted" impacts results in an undefined impact estimate. Where the timber land value impact is an issue, this analysis therefore substitutes a one percent discount rate for undiscounted impacts. Further, Regional timber experts, indicate that six percent is a more accurate rate that is generally being applied for timberland appraisals in the Pacific Northwest at present (Personal communication with Toby Atterbury, President, Atterbury Consultants, Inc. on March 13, 2007).

[4] Land values associated with the option value for development are estimated through review of historic, regional land sales data. As such, they reflect the present value of the development option value based on the implicit discount rate applied by developers during land transactions. Because land value losses occur the instant the land use restriction is placed, no additional calculation of present value applying a social discount rate is necessary.

7. The high-end impact estimates for timber, recreational, and development activities assume that the cutting of tree stands will be prohibited within the areas proposed for final critical habitat. For timber activities, this results in the lost option to harvest; for development and recreation, this assumption manifests in the lost option to develop trails, campgrounds, or residential and commercial developments in the future. Because the analysis assumes that for each activity, all future harvesting or development activities are precluded, the high-end estimate for each of these activities is truly an upper bound. Actual impacts are expected to be less than this extreme.

8. Information describing the economic impacts by subunit across the entire study area is provided in Exhibits ES-2 (areas proposed for final critical habitat) and ES-3 (areas proposed for exclusion according to section 4(b)(2) of the Act).

EXHIBIT ES-2 DETAILED IMPACTS TO ALL ACTIVITIES BY SUBUNIT IN AREAS PROPOSED FOR FINAL CRITICAL HABITAT

UNIT/LANDOWNER	PAST (UNDISCOUNTED)		PAST PRESENT VALUE 3%		PAST PRESENT VALUE 7%		FUTURE (UNDISCOUNTED)		FUTURE PRESENT VALUE 3%		FUTURE PRESENT VALUE 7%	
	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
Unit 1: Private	$0	$0	$0	$0	$0	$0	$0	$26,500,000	$0	$12,200,000	$0	$6,110,000
Unit 2: Private	$0	$0	$0	$0	$0	$0	$0	$27,700,000	$0	$11,300,000	$0	$4,550,000
Unit 2: Lummi Nation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Unit 2: The Nature Conservancy (TNC)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Unit 2: Co-Owned Lummi/TNC	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Unit 3: Private	$0	$0	$0	$0	$0	$0	$7,210,000	$320,000,000	$5,520,000	$135,000,000	$4,080,000	$58,500,000
Unit 3: Grays Harbor County	$78,500	$78,500	$82,700	$82,700	$88,600	$88,600	$314,000	$24,100,000	$240,000	$9,940,000	$178,000	$3,920,000
Unit 3: WA Dept. of Parks and Rec	$1,660	$1,660	$1,930	$1,930	$2,330	$2,330	$21,400	$2,610,000	$19,600	$1,960,000	$17,700	$1,420,000
Unit 3: US BLM	$5,340	$5,340	$6,190	$6,190	$7,480	$7,480	$68,600	$8,360,000	$62,700	$6,290,000	$56,700	$4,560,000
Unit 4: Private	$0	$0	$0	$0	$0	$0	$0	$4,480,000	$0	$1,900,000	$0	$796,000
Unit 4: OR Dept of Forestry	$11,400,000	$11,400,000	$14,400,000	$14,400,000	$20,000,000	$20,000,000	$17,800,000	$660,000,000	$13,600,000	$220,000,000	$10,100,000	$94,300,000
Unit 5: OR Dept of Forestry	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Unit 6: OR Dept of Forestry	$398,000	$398,000	$494,000	$494,000	$413,000	$413,000	$749,000	$21,000,000	$574,000	$6,990,000	$425,000	$3,000,000
Unit 11: Private	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Unit 12: CA Dept of Game and Fish	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Unit 12: CA Dept of Parks and Rec.	$0	$0	$0	$0	$0	$0	$690,000	$690,000	$528,000	$528,000	$391,000	$391,000
Unit 12: Humboldt County	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Unit 13: Private	$0	$0	$0	$0	$0	$0	$6,580,000	$48,200,000	$5,040,000	$15,100,000	$3,730,000	$5,560,000
Unit 13: CA Dept of Parks and Rec.	$12,000	$12,000	$15,300	$15,300	$21,500	$21,500	$200,000	$200,000	$153,000	$153,000	$113,000	$113,000
Unit 13: CA Dept of Forestry	$0	$0	$0	$0	$0	$0	$12,500	$3,210,000	$7,560	$876,000	$3,960	$180,000
Unit 14: Private	$912,000	$912,000	$1,200,000	$1,200,000	$931,000	$931,000	$30,600,000	$260,000,000	$8,400,000	$101,000,000	$2,280,000	$58,700,000
Unit 14: CA Dept of Parks and Rec.	$500,000	$500,000	$639,000	$639,000	$896,000	$896,000	$600,000	$600,000	$460,000	$460,000	$340,000	$340,000
Unit 14: San Mateo County	$130,000	$130,000	$134,000	$134,000	$139,000	$139,000	$130,000	$10,300,000	$99,600	$7,920,000	$73,700	$5,860,000
Unit 14: City Lands	$56,800	$56,800	$61,600	$61,600	$68,500	$68,500	$252,000	$252,000	$192,000	$192,000	$140,000	$140,000
Unit 14: Regional Open Space	$15,000	$20,000	$15,500	$20,600	$16,100	$21,400	$40,000	$40,000	$38,800	$38,800	$37,400	$37,400
Multiple (Administrative Costs)	$2,680,000	$2,680,000	$2,680,000	$2,680,000	$2,680,000	$2,680,000	$4,160,000	$4,160,000	$3,100,000	$3,100,000	$2,200,000	$2,200,000
TOTAL	$16,200,000	$16,300,000	$19,800,000	$19,800,000	$25,200,000	$25,300,000	$69,400,000	$1,420,000,000	$38,100,000	$535,000,000	$24,200,000	$251,000,000

EXHIBIT ES-3 DETAILED IMPACTS TO ALL ACTIVITIES BY SUBUNIT IN AREAS PROPOSED FOR EXCLUSION ACCORDING TO SECTION 4(B)(2)

UNIT/LANDOWNER	PAST (UNDISCOUNTED)		PAST PRESENT VALUE 3%		PAST PRESENT VALUE 7%		FUTURE (UNDISCOUNTED)		FUTURE PRESENT VALUE 3%		FUTURE PRESENT VALUE 7%	
	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
Unit 1: US Forest Service (USFS)	$14,700,000	$14,700,000	$17,300,000	$17,300,000	$21,600,000	$21,600,000	$143,000,000	$143,000,000	$48,400,000	$48,400,000	$21,100,000	$21,100,000
Unit 1: WA Department of Natural Resources (DNR)	$7,950,000	$7,950,000	$9,380,000	$9,380,000	$11,700,000	$11,700,000	$77,000,000	$77,000,000	$26,000,000	$26,000,000	$11,300,000	$11,300,000
Unit 1: Makah Nation	$42,300	$42,300	$48,400	$48,400	$57,900	$57,900	$513,000	$513,000	$173,000	$173,000	$75,300	$75,300
Unit 2: USFS	$28,200,000	$28,200,000	$33,300,000	$33,300,000	$41,600,000	$41,600,000	$276,000,000	$276,000,000	$93,200,000	$93,200,000	$40,600,000	$40,600,000
Unit 2: WA DNR	$3,540,000	$3,540,000	$4,180,000	$4,180,000	$5,230,000	$5,230,000	$34,300,000	$34,300,000	$11,600,000	$11,600,000	$5,040,000	$5,040,000
Unit 3: Service	$9,200	$9,200	$10,900	$10,900	$13,600	$13,600	$18,400	$18,400	$14,100	$14,100	$10,400	$10,400
Unit 3: WA DNR	$3,040,000	$3,040,000	$3,590,000	$3,590,000	$4,490,000	$4,490,000	$29,500,000	$29,500,000	$9,940,000	$9,940,000	$4,330,000	$4,330,000
Unit 3: TNC	$9,900	$9,900	$11,700	$11,700	$14,600	$14,600	$19,800	$19,800	$15,200	$15,200	$11,200	$11,200
Unit 4: USFS	$305,000	$305,000	$359,000	$359,000	$449,000	$449,000	$2,980,000	$2,980,000	$1,010,000	$1,010,000	$438,000	$438,000
Unit 5: USFS	$6,530,000	$6,530,000	$7,700,000	$7,700,000	$9,630,000	$9,630,000	$63,900,000	$63,900,000	$21,600,000	$21,600,000	$9,380,000	$9,380,000
Unit 6: USFS	$96,500	$96,500	$6,870	$6,870	$142,000	$142,000	$943,000	$943,000	$318,000	$318,000	$139,000	$139,000
Unit 7: USFS	$23,100,000	$23,100,000	$27,200,000	$27,200,000	$34,000,000	$34,000,000	$226,000,000	$226,000,000	$76,100,000	$76,100,000	$33,100,000	$33,100,000
Unit 7: State of Oregon	$4,190	$4,190	$4,940	$4,940	$6,190	$6,190	$41,800	$41,800	$14,000	$14,000	$6,010	$6,010
Unit 8: USFS	$16,500	$16,500	$19,400	$19,400	$24,300	$24,300	$161,000	$161,000	$54,400	$54,400	$23,700	$23,700
Unit 8: State of Oregon	$3,140,000	$3,140,000	$3,710,000	$3,710,000	$4,640,000	$4,640,000	$31,400,000	$31,400,000	$10,500,000	$10,500,000	$4,510,000	$4,510,000
Unit 9: USFS	$2,910,000	$2,910,000	$3,430,000	$3,430,000	$4,290,000	$4,290,000	$28,500,000	$28,500,000	$9,600,000	$9,600,000	$4,180,000	$4,180,000
Unit 10: USFS	$13,100,000	$13,100,000	$15,500,000	$15,500,000	$19,300,000	$19,300,000	$128,000,000	$128,000,000	$43,300,000	$43,300,000	$18,800,000	$18,800,000
Unit 11: US Bureau of Land Management (BLM)	$8,780,000	$8,780,000	$10,400,000	$10,400,000	$12,900,000	$12,900,000	$1,780,000	$1,780,000	$601,000	$601,000	$262,000	$262,000
Unit 11: USFS	$182,000	$182,000	$215,000	$215,000	$268,000	$268,000	$85,800,000	$85,800,000	$29,000,000	$29,000,000	$12,600,000	$12,600,000
Unit 12: Private	$1,480,000	$1,480,000	$1,720,000	$1,720,000	$2,100,000	$2,100,000	$2,620,000	$2,620,000	$1,140,000	$1,140,000	$713,000	$713,000
Unit 13: US BLM	$1,290,000	$1,290,000	$1,530,000	$1,530,000	$1,910,000	$1,910,000	$12,700,000	$12,700,000	$4,270,000	$4,270,000	$1,860,000	$1,860,000
Multiple (Administrative Costs)	$41,900,000	$41,900,000	$41,900,000	$41,900,000	$41,900,000	$41,900,000	$65,200,000	$65,200,000	$48,500,000	$48,500,000	$34,500,000	$34,500,000
TOTAL	$160,000,000	$160,000,000	$181,000,000	$181,000,000	$216,000,000	$216,000,000	$1,210,000,000	$1,210,000,000	$435,000,000	$435,000,000	$203,000,000	$203,000,000

9. Exhibits ES-4 to ES-6 illustrate those landowner subunits that account for the greatest share of forecast impacts under the low- and high-end scenario estimates according to the various discount rate assumptions. As discussed, total high-end impacts (regardless of discount rate applied) are driven by decreases in land values associated with precluding timber harvest. These exhibits highlight how the relative rankings of the landowner subunits change depending on scenario assumed (low- or high-end impacts) and discount rate applied.

10. Because impacts to timber management activities drive the results of the analysis, the impacts by subunit are in large part a function of the level of silviculture that occurs in a unit (the entire area is not actively managed for silviculture as there are recreation and conservation areas, as well), the size of the subunit, and by the relative value of the timber within the subunit. To better understand how the overall size of a subunit may drive the level of estimated impacts, Exhibit ES-7 highlights the high-end average impact per acre for the ten highest ranked subunits proposed for final critical habitat.

11. This exhibit evidences that while the largest unit is expected to bear the greatest impact (Unit 4), the average per acre impact is relatively low in this unit. Average per acre impacts fall for the most part between $1,740 (Unit 6 Oregon Department of Forestry lands) to $17,000 (Unit 3 Private Landowners). The variation for these units stems primarily from the variable values of timber in different regions (as highlighted in Section 4). One clear outlier, however, is the $105,000 average per acre impact in Unit 14, Private Landowners subunit. In this case, the existence of a specific recreational development project in the subunit drives the high average per acre impact. For such subunits with specific projects, total estimated impacts are not expected to be diluted across the entire area of the subunit.

EXHIBIT ES-4 LANDOWNER SUBUNITS RANKED BY LEVEL OF IMPACT (UNDISCOUNTED)

UNIT/ LANDOWNER	ESTIMATED LOW END IMPACTS (UNDISCOUNTED)	PERCENT OF TOTAL LOW END IMPACTS	UNIT/ LANDOWNER	ESTIMATED HIGH END IMPACTS (UNDISCOUNTED)	PERCENT OF TOTAL HIGH END IMPACTS
Unit 14 - Private	$30,600,000	44.1%	Unit 4 - OR Dept of Forestry	$660,000,000	46.4%
Unit 4 - OR Dept of Forestry	$17,800,000	25.6%	Unit 3 - Private	$320,000,000	22.5%
Unit 3 - Private	$7,210,000	10.4%	Unit 14 - Private	$260,000,000	18.3%
Unit 13 - Private	$6,580,000	9.5%	Unit 13 - Private	$48,200,000	3.4%
Multiple (Administrative Costs)	$4,160,000	6.0%	Unit 2 - Private	$27,700,000	1.9%
Unit 6 - OR Dept of Forestry	$749,000	1.1%	Unit 1 - Private	$26,500,000	1.9%
Unit 12 - CA Dept of Parks and Rec	$690,000	1.0%	Unit 3 - Grays Harbor County	$24,100,000	1.7%
Unit 14 - CA Dept of Parks and Rec	$600,000	0.9%	Unit 6 - OR Dept of Forestry	$21,000,000	1.5%
Unit 3 - Grays Harbor County	$314,000	0.5%	Unit 14 - San Mateo County	$10,300,000	0.7%
Unit 14 - City Lands	$252,000	0.4%	Unit 3 - US BLM	$8,360,000	0.6%
Unit 13 - CA Dept of Parks and Rec	$200,000	0.3%	Unit 4 - Private	$4,480,000	0.3%
Unit 14 - San Mateo County	$130,000	0.2%	Multiple (Administrative Costs)	$4,160,000	0.3%
Unit 3 - US BLM	$68,600	0.1%	Unit 13 - CA Dept of Forestry	$3,210,000	0.2%
Unit 14 - Regional Open Space	$40,000	0.1%	Unit 3 - WA State Parks and Rec	$2,610,000	0.2%
Unit 3 - WA State Parks and Rec	$21,400	0.0%	Unit 12 - CA Dept of Parks and Rec	$690,000	0.0%
Unit 13 - CA Dept of Forestry	$12,500	0.0%	Unit 14 - CA Dept of Parks and Rec	$600,000	0.0%
Unit 1 - Private	$0	0.0%	Unit 14 - City Lands	$252,000	0.0%
Unit 2 - Private	$0	0.0%	Unit 13 - CA Dept of Parks and Rec	$200,000	0.0%
Unit 2 - Lummi Nation	$0	0.0%	Unit 14 - Regional Open Space	$40,000	0.0%
Unit 2 - The Nature Conservancy	$0	0.0%	Unit 2 - Lummi Nation	$0	0.0%
Unit 2 - Co-Owned Lummi/TNC	$0	0.0%	Unit 2 - The Nature Conservancy	$0	0.0%
Unit 4 - Private	$0	0.0%	Unit 2 - Co-Owned Lummi/TNC	$0	0.0%
Unit 5 - OR Dept of Forestry	$0	0.0%	Unit 5 - OR Dept of Forestry	$0	0.0%
Unit 11 - Private	$0	0.0%	Unit 11 - Private	$0	0.0%
Unit 12 - CA Dept of Game and Fish	$0	0.0%	Unit 12 - CA Dept of Game and Fish	$0	0.0%
Unit 12 - Humboldt County	$0	0.0%	Unit 12 - Humboldt County	$0	0.0%

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EXHIBIT ES-5 LANDOWNER SUBUNITS RANKED BY LEVEL OF PRESENT VALUE IMPACT (3% DISCOUNT RATE)

UNIT/ LANDOWNER	ESTIMATED LOW END IMPACTS (3 PERCENT)	PERCENT OF TOTAL LOW END IMPACTS	UNIT/ LANDOWNER	ESTIMATED HIGH END IMPACTS (3 PERCENT)	PERCENT OF TOTAL HIGH END IMPACTS
Unit 4 - OR Dept of Forestry	$13,600,000	35.8%	Unit 4 - OR Dept of Forestry	$220,000,000	41.1%
Unit 14 - Private	$8,400,000	22.1%	Unit 3 - Private	$135,000,000	25.2%
Unit 3 - Private	$5,520,000	14.5%	Unit 14 - Private	$101,000,000	18.9%
Unit 13 - Private	$5,040,000	13.3%	Unit 13 - Private	$15,100,000	2.8%
Multiple (Administrative Costs)	$3,100,000	8.2%	Unit 1 - Private	$12,200,000	2.3%
Unit 6 - OR Dept of Forestry	$574,000	1.5%	Unit 2 - Private	$11,300,000	2.1%
Unit 12 - CA Dept of Parks and Rec	$528,000	1.4%	Unit 3 - Grays Harbor County	$9,940,000	1.9%
Unit 14 - CA Dept of Parks and Rec	$460,000	1.2%	Unit 14 - San Mateo County	$7,920,000	1.5%
Unit 3 - Grays Harbor County	$240,000	0.6%	Unit 6 - OR Dept of Forestry	$6,990,000	1.3%
Unit 14 - City Lands	$192,000	0.5%	Unit 3 - US BLM	$6,290,000	1.2%
Unit 13 - CA Dept of Parks and Rec	$153,000	0.4%	Multiple (Administrative Costs)	$3,100,000	0.6%
Unit 14 - San Mateo County	$99,600	0.3%	Unit 3 - WA State Parks and Rec	$1,960,000	0.4%
Unit 3 - US BLM	$62,700	0.2%	Unit 4 - Private	$1,900,000	0.4%
Unit 14 - Regional Open Space	$38,800	0.1%	Unit 13 - CA Dept of Forestry	$876,000	0.2%
Unit 3 - WA State Parks and Rec	$19,600	0.1%	Unit 12 - CA Dept of Parks and Rec	$528,000	0.1%
Unit 13 - CA Dept of Forestry	$7,560	0.0%	Unit 14 - CA Dept of Parks and Rec	$460,000	0.1%
Unit 1 - Private	$0	0.0%	Unit 14 - City Lands	$192,000	0.0%
Unit 2 - Private	$0	0.0%	Unit 13 - CA Dept of Parks and Rec	$153,000	0.0%
Unit 2 - Lummi Nation	$0	0.0%	Unit 14 - Regional Open Space	$38,800	0.0%
Unit 2 - The Nature Conservancy	$0	0.0%	Unit 2 - Lummi Nation	$0	0.0%
Unit 2 - Co-Owned Lummi/TNC	$0	0.0%	Unit 2 - The Nature Conservancy	$0	0.0%
Unit 4 - Private	$0	0.0%	Unit 2 - Co-Owned Lummi/TNC	$0	0.0%
Unit 5 - OR Dept of Forestry	$0	0.0%	Unit 5 - OR Dept of Forestry	$0	0.0%
Unit 11 - Private	$0	0.0%	Unit 11 - Private	$0	0.0%
Unit 12 - CA Dept of Game and Fish	$0	0.0%	Unit 12 - CA Dept of Game and Fish	$0	0.0%
Unit 12 - Humboldt County	$0	0.0%	Unit 12 - Humboldt County	$0	0.0%

ES-9

EXHIBIT ES-6 LANDOWNER SUBUNITS RANKED BY LEVEL OF PRESENT VALUE IMPACT (7% DISCOUNT RATE)

UNIT/ LANDOWNER	ESTIMATED LOW END IMPACTS (7 PERCENT)	PERCENT OF TOTAL LOW END IMPACTS	UNIT/ LANDOWNER	ESTIMATED HIGH END IMPACTS (7 PERCENT)	PERCENT OF TOTAL HIGH END IMPACTS
Unit 4 - OR Dept of Forestry	$10,100,000	41.8%	Unit 4 - OR Dept of Forestry	$94,300,000	37.6%
Unit 3 - Private	$4,080,000	16.9%	Unit 14 - Private	$58,700,000	23.4%
Unit 13 - Private	$3,730,000	15.4%	Unit 3 - Private	$58,500,000	23.3%
Unit 14 - Private	$2,280,000	9.4%	Unit 1 - Private	$6,110,000	2.4%
Multiple (Administrative Costs)	$2,200,000	9.1%	Unit 14 - San Mateo County	$5,860,000	2.3%
Unit 6 - OR Dept of Forestry	$425,000	1.8%	Unit 13 - Private	$5,560,000	2.2%
Unit 12 - CA Dept of Parks and Rec	$391,000	1.6%	Unit 3 - US BLM	$4,560,000	1.8%
Unit 14 - CA Dept of Parks and Rec	$340,000	1.4%	Unit 2 - Private	$4,550,000	1.8%
Unit 3 - Grays Harbor County	$178,000	0.7%	Unit 3 - Grays Harbor County	$3,920,000	1.6%
Unit 14 - City Lands	$140,000	0.6%	Unit 6 - OR Dept of Forestry	$3,000,000	1.2%
Unit 13 - CA Dept of Parks and Rec	$113,000	0.5%	Multiple (Administrative Costs)	$2,200,000	0.9%
Unit 14 - San Mateo County	$73,700	0.3%	Unit 3 - WA State Parks and Rec	$1,420,000	0.6%
Unit 3 - US BLM	$56,700	0.2%	Unit 4 - Private	$796,000	0.3%
Unit 14 - Regional Open Space	$37,400	0.2%	Unit 12 - CA Dept of Parks and Rec	$391,000	0.2%
Unit 3 - WA State Parks and Rec	$17,700	0.1%	Unit 14 - CA Dept of Parks and Rec	$340,000	0.1%
Unit 13 - CA Dept of Forestry	$3,960	0.0%	Unit 13 - CA Dept of Forestry	$180,000	0.1%
Unit 1 - Private	$0	0.0%	Unit 14 - City Lands	$140,000	0.1%
Unit 2 - Private	$0	0.0%	Unit 13 - CA Dept of Parks and Rec	$113,000	0.0%
Unit 2 - Lummi Nation	$0	0.0%	Unit 14 - Regional Open Space	$37,400	0.0%
Unit 2 - The Nature Conservancy	$0	0.0%	Unit 2 - Lummi Nation	$0	0.0%
Unit 2 - Co-Owned Lummi/TNC	$0	0.0%	Unit 2 - The Nature Conservancy	$0	0.0%
Unit 4 - Private	$0	0.0%	Unit 2 - Co-Owned Lummi/TNC	$0	0.0%
Unit 5 - OR Dept of Forestry	$0	0.0%	Unit 5 - OR Dept of Forestry	$0	0.0%
Unit 11 - Private	$0	0.0%	Unit 11 - Private	$0	0.0%
Unit 12 - CA Dept of Game and Fish	$0	0.0%	Unit 12 - CA Dept of Game and Fish	$0	0.0%
Unit 12 - Humboldt County	$0	0.0%	Unit 12 - Humboldt County	$0	0.0%

ES-10

EXHIBIT ES-7 HIGH END IMPACTS AND AVERAGE PER ACRE IMPACTS FOR HIGHEST RANKED SUBUNITS

SUBUNIT	UNDISCOUNTED		PRESENT VALUE (3%)		PRESENT VALUE (7%)	
	TOTAL IMPACTS	AVERAGE PER ACRE IMPACTS	TOTAL IMPACTS	AVERAGE PER ACRE IMPACTS	TOTAL IMPACTS	AVERAGE PER ACRE IMPACTS
Unit 4 - OR Dept of Forestry	$660,000,000	$9,530	$220,000,000	$3,180	$94,300,000	$1,360
Unit 3 - Private	$320,000,000	$17,000	$135,000,000	$7,170	$58,500,000	$3,110
Unit 14 - Private	$260,000,000	$105,000	$101,000,000	$41,000	$58,700,000	$23,800
Unit 13 - Private	$48,200,000	$8,800	$15,100,000	$14,500	$5,560,000	$5,330
Unit 2 - Private	$27,700,000	$12,800	$11,300,000	$5,210	$4,550,000	$2,100
Unit 1 - Private	$26,500,000	$14,900	$12,200,000	$6,870	$6,110,000	$3,440
Unit 3 - Grays Harbor County	$24,100,000	$15,400	$9,940,000	$6,350	$3,920,000	$2,510
Unit 6 - OR Dept of Forestry	$21,000,000	$1,740	$6,990,000	$579	$3,000,000	$248
Unit 14 - San Mateo County	$10,300,000	$5,640	$7,920,000	$4,340	$5,860,000	$3,210
Unit 3 - US BLM	$8,360,000	$7,260	$6,290,000	$5,460	$4,560,000	$3,960

SECTION 1 | FRAMEWORK FOR THE ANALYSIS

1. The purpose of this report is to estimate the economic impact of actions taken to protect the federally listed marbled murrelet (*Brachyramphus marmoratus marmoratus*) (hereafter, "murrelet") and its habitat. It attempts to quantify the economic effects associated with the proposed designation of critical habitat. It does so by taking into account the cost of conservation-related measures that are likely to be associated with future economic activities that may adversely affect habitat within the study area.[1] The analysis looks retrospectively at costs incurred since the murrelet was listed, and forecasts impacts likely to occur after the proposed critical habitat is finalized.

2. This information is intended to assist the Secretary in determining whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation.[2] In addition, this information allows the Service to address the requirements of Executive Orders 12866 and 13211, and the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).[3] This report also complies with direction from the U.S. Court of Appeals for the 10th Circuit that "co-extensive" effects should be included in the economic analysis to inform decision-makers regarding which areas to designate as critical habitat.[4]

3. This section describes the framework for the analysis. First, it describes the general analytic approach to estimating economic effects, including a discussion of both efficiency and distributional effects. Next, this section discusses the scope of the analysis, including the link between existing and critical habitat-related protection efforts and economic impacts. It then presents the analytic time frame used in the report. Finally, this section lists the information sources relied upon in the analysis.

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[1] For the purposes of this analysis, the "study area" is defined as both areas proposed for final critical habitat, as well as areas proposed for exclusion from critical habitat under section 4(b)(2) of the Act.

[2] 16 U.S.C. '1533(b)(2).

[3] Executive Order 12866, Regulatory Planning and Review, September 30, 1993; Executive Order 13211, Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use, May 18, 2001; 5. U.S.C. "601 et seq; and Pub Law No. 104-121.

[4] In 2001, the U.S. Court of Appeals for the 10th Circuit instructed the Service to conduct a full analysis of all of the economic impacts of proposed critical habitat, regardless of whether those impacts are attributable co-extensively to other causes (New Mexico Cattle Growers Ass=n v. U.S.F.W.S., 248 F.3d 1277 (10th Cir. 2001)).

1.1 APPROACH TO ESTIMATING ECONOMIC EFFECTS

4. This economic analysis considers both the economic efficiency and distributional effects that may result from efforts to protect the murrelet and its habitat (hereinafter referred to collectively as "murrelet conservation efforts"). Economic efficiency effects generally reflect "opportunity costs" associated with the commitment of resources required to accomplish species and habitat conservation. For example, if activities that can take place on a parcel of land are limited as a result of the designation or the presence of the species, and thus the market value of the land is reduced, this reduction in value represents one measure of opportunity cost or change in economic efficiency. Similarly, the costs incurred by a Federal action agency to consult with the Service under section 7 represent opportunity costs of murrelet conservation efforts.

5. This analysis also addresses the distribution of impacts associated with the designation, including an assessment of any local or regional impacts of habitat conservation and the potential effects of conservation efforts on small entities and the energy industry. This information may be used by decision-makers to assess whether the effects of murrelet conservation efforts unduly burden a particular group or economic sector. For example, while conservation efforts may have a relatively small impact relative to the national economy, individuals employed in a particular sector of the regional economy may experience relatively greater impacts. The differences between economic efficiency effects and distributional effects, as well as their application in this analysis, are discussed in greater detail below.

1.1.1 EFFICIENCY EFFECTS

6. At the guidance of the Office of Management and Budget (OMB) and in compliance with Executive Order 12866 "Regulatory Planning and Review," Federal agencies measure changes in economic efficiency in order to understand how society, as a whole, will be affected by a regulatory action. In the context of regulations that protect murrelet habitat, these efficiency effects represent the opportunity cost of resources used or benefits foregone by society as a result of the regulations. Economists generally characterize opportunity costs in terms of changes in producer and consumer surpluses in affected markets.[5]

7. In some instances, compliance costs may provide a reasonable approximation for the efficiency effects associated with a regulatory action. For example, a Federal land manager, such as the U.S. Forest Service, may enter into a consultation with the Service to ensure that a particular activity will not adversely modify critical habitat. The effort required for the consultation is an economic opportunity cost because the landowner or manager's time and effort would have been spent in an alternative activity had the parcel not been included in the designation. When compliance activity is not expected to significantly affect markets -- that is, not result in a shift in the quantity of a good or

[5] For additional information on the definition of "surplus" and an explanation of consumer and producer surplus in the context of regulatory analysis, see: Gramlich, Edward M., A Guide to Benefit-Cost Analysis (2nd Ed.), Prospect Heights, Illinois: Waveland Press, Inc., 1990; and U.S. Environmental Protection Agency, Guidelines for Preparing Economic Analyses, EPA 240-R-00-003, September 2000, available at http://yosemite.epa.gov/ee/epa/eed.nsf/ webpages/Guidelines.html.

service provided at a given price, or in the quantity of a good or service demanded given a change in price -- the measurement of compliance costs can provide a reasonable estimate of the change in economic efficiency.

8. Where habitat protection measures are expected to significantly impact a market, it may be necessary to estimate changes in producer and consumer surpluses. For example, a designation that precludes the development of large areas of land may shift the price and quantity of housing supplied in a region. In this case, changes in economic efficiency (i.e., social welfare) can be measured by considering changes in producer and consumer surplus in the market.

9. This analysis begins by measuring impacts associated with efforts undertaken to protect murrelet and its habitat. As noted above, in some cases, compliance costs can provide a reasonable estimate of changes in economic efficiency. However, if the cost of conservation efforts is expected to significantly impact markets, the analysis will consider potential changes in consumer and/or producer surplus in affected markets.

1.1.2 DISTRIBUTIONAL AND REGIONAL ECONOMIC EFFECTS

10. Measurements of changes in economic efficiency focus on the net impact of conservation efforts, without consideration of how certain economic sectors or groups of people are affected. Thus, a discussion of efficiency effects alone may miss important distributional considerations. OMB encourages Federal agencies to consider distributional effects separately from efficiency effects.[6] This analysis considers several types of distributional effects, including impacts on small entities; impacts on energy supply, distribution, and use; and regional economic impacts. It is important to note that these are fundamentally different measures of economic impact than efficiency effects, and thus cannot be added to or compared with estimates of changes in economic efficiency.

[6] U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf.

Calculating Present Value and Annualized Impacts

For each land use activity, this analysis presents economic impacts incurred in different time periods in present value terms. The present value represents the value of a payment or stream of payments in common dollar terms. That is, it is the sum of a series of past or future cash flows expressed in today's dollars. Translation of the economic impacts of past or future impacts to present value terms requires the following: a) past or projected future impacts of murrelet conservation efforts; and b) the specific years in which these impacts have been or are expected to be incurred. With these data, the present value of the past or future stream of impacts (PV_c) of murrelet conservation efforts from year t to T is measured in 2007 dollars according to the following standard formula:[a]

$$PV_c = \sum_{t=t_0}^{t=T} \frac{C_t}{(1+r)^{t-2007}}$$

C_t = cost of murrelet conservation efforts in year t

r = discount rate[b]

Impacts of conservation efforts for each land use activity in each unit are also expressed as annualized values (i.e., the series of equal annual costs over some defined time period that have the same present value as estimated total impacts). Annualized values are calculated to provide comparison of impacts across activities with varying forecast periods (T). This analysis, other than land use value impacts, employs a forecast period of 20 years, 2007 through 2026.[c] Annualized impacts of future murrelet conservation efforts (APV_c) are calculated using the following standard formula:

$$APV_c = PV_c \left[\frac{r}{1-(1+r)^{-(N)}} \right]$$

N = number of years in the forecast period

[a] To derive the present value of pre-designation conservation efforts for this analysis, t is 1992 and T is 2006; to derive the present value of post-designation conservation efforts, t is 2007 and T is 2026.

[b] To discount and annualize costs, guidance provided by the OMB specifies the use of a real rate of seven percent. In addition, OMB recommends sensitivity analysis using other discount rates such as three percent, which some economists believe better reflects the social rate of time preference. (U.S. Office of Management and Budget, Circular A-4, September 17, 2003 and U.S. Office of Management and Budget, "Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice," 68 *Federal Register* 5492, February 3, 2003.)

[c] Land value impacts associated with restrictions on timber and development are calculated assuming all future use of the land for timber harvest and development is precluded. While calculated applying a perpetuity, this estimate reflects an impact on land value expected to be experienced at the time the rule is finalized.

Impacts on Small Entities and Energy Supply, Distribution, and Use

11. This analysis considers how small entities, including small businesses, organizations, and governments, as defined by the Regulatory Flexibility Act, might be affected by future murrelet conservation efforts.[7] In addition, in response to Executive Order 13211 "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," this analysis considers the future impacts of conservation efforts on the energy industry and its customers.[8]

Regional Economic Effects

12. Regional economic impact analysis can provide an assessment of the potential localized effects of conservation efforts. Specifically, regional economic impact analysis produces a quantitative estimate of the potential magnitude of the initial change in the regional economy resulting from a regulatory action. Regional economic impacts are commonly measured using regional input/output models. These models rely on multipliers that represent the relationship between a change in one sector of the economy (e.g., expenditures by recreators) and the effect of that change on economic output, income, or employment in other local industries (e.g., suppliers of goods and services to recreators). These economic data provide a quantitative estimate of the magnitude of shifts of jobs and revenues in the local economy.

13. The use of regional input/output models in an analysis of the impacts of species and habitat conservation efforts can overstate the long-term impacts of a regulatory change. Most importantly, these models provide a static view of the economy of a region. That is, they measure the initial impact of a regulatory change on an economy but do not consider long-term adjustments that the economy will make in response to this change. For example, these models provide estimates of the number of jobs lost as a result of a regulatory change, but do not consider re-employment of these individuals over time or other adaptive responses by impacted businesses. In addition, the flow of goods and services across the regional boundaries defined in the model may change as a result of the regulation, compensating for a potential decrease in economic activity within the region.

14. Despite these and other limitations, in certain circumstances regional economic impact analysis may provide useful information about the scale and scope of localized impacts. It is important to remember that measures of regional economic effects generally reflect shifts in resource use rather than efficiency losses. Thus, these types of distributional effects are reported separately from efficiency effects (i.e., not summed). In addition, measures of regional economic impact cannot be compared with estimates of efficiency effects, but should be considered as distinct measures of impact.

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[7] 5 U.S.C. ' 601 et seq.

[8] Executive Order 13211, Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use, May 18, 2001.

1.2 SCOPE OF THE ANALYSIS

15. This analysis identifies those economic activities most likely to threaten the listed species and its habitat and, where possible, quantifies the economic impact to avoid, mitigate, or compensate for such threats within the boundaries of the study area. In instances where critical habitat is being proposed after a species is listed, some future impacts may be unavoidable, regardless of the final designation and exclusions under 4(b)(2). However, due to the difficulty in making a credible distinction between listing and critical habitat effects within critical habitat boundaries, this analysis considers all future conservation-related impacts to be co-extensive with the designation.[9,10]

16. Co-extensive effects may also include impacts associated with overlapping protective measures of other Federal, state, and local laws that aid habitat conservation in the areas proposed for designation. In past instances, some of these measures have been precipitated by the listing of the species and/or impending designation of critical habitat. Because conservation efforts affording protection to a listed species likely contribute to the efficacy of critical habitat designation, the impacts of these actions are considered relevant for understanding the full effect of critical habitat designation. Enforcement actions taken in response to violations of the Act, however, are not included.

1.2.1 SECTIONS OF THE ACT RELEVANT TO THE ANALYSIS

17. This analysis focuses on activities that are influenced by the Service through sections 4, 7, 9, and 10 of the Act. Section 4 of the Act focuses on the listing and recovery of endangered and threatened species, as well as the critical habitat. In this section, the Secretary is required to list species as endangered or threatened "solely on the basis of the best available scientific and commercial data."[11] Section 4 also requires the Secretary to designate critical habitat "on the basis of the best scientific data available and after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat."[12]

18. The protections afforded to threatened and endangered species and their habitat are described in sections 7, 9, and 10 of the Act, and economic impacts resulting from these protections are the focus of this analysis:

- Section 7 of the Act requires Federal agencies to consult with the Service to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species or result in the

[9] In 2001, the U.S. Court of Appeals for the 10th Circuit instructed the Service to conduct a full analysis of all of the economic impacts of proposed critical habitat, regardless of whether those impacts are attributable co-extensively to other causes (New Mexico Cattle Growers Assn v. U.S.F.W.S., 248 F.3d 1277 (10th Cir. 2001)).

[10] In 2004, the U.S. Ninth Circuit invalidated the Service's regulation defining destruction or adverse modification of critical habitat (Gifford Pinchot Task Force v. United States Fish and Wildlife Service). The Service is currently reviewing the decision to determine what effect it (and to a limited extent Center for Biological Diversity v. Bureau of Land Management (Case No. C-03-2509-SI, N.D. Cal.)) may have on the outcome of consultations pursuant to section 7 of the Act.

[11] 16 U.S.C. 1533.

[12] 16 U.S.C. 1533.

destruction or adverse modification of critical habitat. The administrative costs of these consultations, along with the costs of project modifications resulting from these consultations, represent compliance costs associated with the listing of the species and proposed critical habitat.[13]

- Section 9 defines the actions that are prohibited by the Act. In particular, it prohibits the "take" of endangered wildlife, where "take" means to "harass, harm, pursue, or collect, or to attempt to engage in any such conduct."[14] The economic impacts associated with this section manifest themselves in sections 7 and 10.
- Under section 10(a)(1)(B) of the Act, an entity (e.g., a landowner or local government) may develop a Habitat Conservation Plan (HCP) for an endangered animal species in order to meet the conditions for issuance of an incidental take permit in connection with the development and management of a property.[15] The requirements posed by the HCP may have economic impacts associated with the goal of ensuring that the effects of incidental take are adequately minimized and mitigated. The designation of critical habitat does not require completion of an HCP; however, the designation may influence conservation measures provided under HCPs.

1.2.2 OTHER RELEVANT PROTECTION EFFORTS

19. The protection of listed species and habitat is not limited to the Act. Other Federal agencies, as well as State and local governments, may also seek to protect the natural resources under their jurisdiction. For the purpose of this analysis, such protective efforts are considered to be co-extensive with the protection offered by critical habitat, and costs associated with these efforts are included in this report. In addition, under certain circumstances, critical habitat may provide new information to a community about the sensitive ecological nature of a geographic region, potentially triggering additional economic impacts under other State or local laws. In cases where these costs would not have been triggered absent the designation of critical habitat, they are included in this economic analysis.

1.2.3 ADDITIONAL ANALYTIC CONSIDERATIONS

20. This analysis also considers the potential for other types of economic impacts that can be related to section 7 consultations in general and critical habitat in particular, including time delay, regulatory uncertainty, and stigma impacts.

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[13] The Service notes, however, that a recent Ninth Circuit judicial opinion, Gifford Pinchot Task Force v. United States Fish and Wildlife Service, has invalidated the Service's regulation defining destruction or adverse modification of critical habitat. The Service is currently reviewing the decision to determine what effect it (and to a limited extent Center for Biological Diversity v. Bureau of Land Management (Case No. C-03-2509-SI, N.D. Cal.)) may have on the outcome of consultations pursuant to section 7 of the Act.

[14] 16 U.S.C. 1532.

[15] U.S. Fish and Wildlife Service, "Endangered Species and Habitat Conservation Planning," August 6, 2002, accessed at http://endangered.fws.gov/hcp/.

Time Delay and Regulatory Uncertainty Impacts

21. Time delays are costs due to project delays associated with the consultation process or compliance with other regulations. Regulatory uncertainty costs occur in anticipation of having to modify project parameters (e.g., retaining outside experts or legal counsel to better understand their responsibilities with regard to critical habitat). For example, in the case of the murrelet critical habitat, time delays on construction projects to avoid murrelet may require land managers to conduct activities in a more condensed time frame than otherwise. This analysis does not quantify any impacts of time delay or regulatory uncertainty.

Stigma Impacts

22. Stigma refers to the change in economic value of a particular project or activity due to negative (or positive) perceptions of the role critical habitat will play in developing, implementing, or conducting that policy. For example, changes to private property values associated with public attitudes about the limits and costs of implementing a project in critical habitat are known as "stigma" impacts. This analysis does not quantify any stigma impacts associated with the proposed critical habitat designation for the murrelet; however, the high-end impact estimate in this analysis incorporates reductions in land value associated with precluding particular economic uses of the land, such as timber harvest and development. As a result, any stigma associated with critical habitat designation is not expected to result in additional economic impacts to those quantified in this analysis.

1.2.4 BENEFITS

23. Under Executive Order 12866, OMB directs Federal agencies to provide an assessment of both the social costs and benefits of proposed regulatory actions.[16] OMB's Circular A-4 distinguishes two types of economic benefits: *direct benefits and ancillary benefits*. Ancillary benefits are defined as favorable impacts of a rulemaking that are typically unrelated, or secondary, to the statutory purpose of the rulemaking.[17]

24. In the context of critical habitat, the primary purpose of the rulemaking (i.e., the direct benefit) is the potential to enhance conservation of the species. The published economics literature has documented that social welfare benefits can result from the conservation and recovery of endangered and threatened species. In its guidance for implementing Executive Order 12866, OMB acknowledges that it may not be feasible to monetize, or even quantify, the benefits of environmental regulations due to either an absence of defensible, relevant studies or a lack of resources on the implementing agency's part to conduct new research.[18] *Rather than rely on economic measures, the Service believes that*

[16] Executive Order 12866, Regulatory Planning and Review, September 30, 1993.

[17] U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf.

[18] Ibid.

the direct benefits of the proposed rule are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.

25. Critical habitat designation may also generate ancillary benefits. Critical habitat aids in the conservation of species specifically by protecting the primary constituent elements on which the species depends. To this end, critical habitat designation can result in maintenance of particular environmental conditions that may generate other social benefits aside from the preservation of the species. That is, management actions undertaken to conserve a species or habitat may have coincident, positive social welfare implications, such as increased recreational opportunities in a region. While they are not the primary purpose of critical habitat, these ancillary benefits may result in gains in employment, output, or income that may offset the direct, negative impacts to a region's economy resulting from actions to conserve a species or its habitat.

26. It is often difficult to evaluate the ancillary benefits of critical habitat designation. To the extent that the ancillary benefits of the rulemaking may be captured by the market through an identifiable shift in resource allocation, they are factored into the overall economic impact assessment in this report. For example, if habitat preserves are created to protect a species, the value of existing residential property adjacent to those preserves may increase, resulting in a measurable positive impact. Where data are available, this analysis attempts to capture the *net* economic impact (i.e., the increased regulatory burden less any discernable offsetting market gains), of species conservation efforts imposed on regulated entities and the regional economy.

27. Murrelet conservation may result in economic benefits associated with wildlife viewing. This analysis does not, however, quantify enhanced wildlife viewing associated with murrelet conservation. First, data are not available regarding the number of wildlife viewing participants within the study area. Information is also not available to estimate the increment by which wildlife viewing may be improved in the case that the murrelet conservation efforts described in this analysis are undertaken. More specifically, the extent to which the likelihood of viewing murrelet is increased due to these conservation efforts, and the incremental value of a wildlife viewing trip associated with the increased chance of murrelet sightings, are unknown.

1.2.5 GEOGRAPHIC SCOPE OF THE ANALYSIS

28. The geographic scope of the analysis includes areas proposed for final critical habitat as well as areas proposed for exclusion from critical habitat according to section 4(b)(2) of the Act, collectively referred to as the "study area" for the purposes of this analysis. The economic impacts of the critical habitat designation are estimated for each of these two categories of land identified in the proposed rule. The analysis quantifies impacts to land use activities within or affecting the entire study area, but focuses on those areas proposed for final critical habitat.

29. Section 2 describes the geographic scale at which results of the analysis are aggregated.

1.3 ANALYTIC TIME FRAME

30. The analysis estimates impacts based on activities that are "reasonably foreseeable," including, but not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. The analysis estimates economic impacts to activities from 1992 (year of the species' final listing) to 2026 (20 years from the expected year of final critical habitat designation). Estimated impacts are divided into pre-designation (1992-2006) and post-designation (2007-2026) impacts.[19] The land uses within the study area are not expected to substantially change over this time period.

31. Where information is available to reliably forecast economic activity beyond the 20-year time frame, this analysis incorporates that information. Land value impacts associated with restrictions on timber harvest and development are calculated assuming all future use of the land for timber harvest and development is precluded. While the decreased land value is calculated assuming the services provided by those lands are lost in perpetuity, the resulting estimate reflects an impact on land value that is expected to be experienced at the time the rule is made final. It is therefore an impact that is assumed to be experienced within a 20-year time frame.

1.4 INFORMATION SOURCES

32. The primary sources of information for this report are communications with, and data provided by, personnel from the Service, Federal, State, and local governments and other stakeholders. In addition, this analysis relies upon the Service's section 7 consultation records, and existing habitat management and conservation plans that consider the murrelet. Due to the high number of entities contacted, the complete list of contacted stakeholders is within the reference section at the end of this document.

1.5 STRUCTURE OF REPORT

33. This remainder of this report is organized as follows:

- Section 2: Background;
- Section 3: Areas Proposed for Exclusion Under Section 4(b)(2) of the Act;
- Section 4: Timber Activities;
- Section 5: Development;
- Section 6: Recreation;
- Section 7: Other Land Use Activities;
- References;

[19] As described in the Proposed Rule, the Service first designated critical habitat for this species in 1996 (U.S. Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for the Marbled Murrelet; Final Rule, 61 FR 102, May 24, 1996). "Pre-designation" and "post-designation" in this report refer to the revised final critical habitat designation expected in 2007.

- Appendix A: Consultation Costs;
- Appendix B: Small Business and Energy Impacts Analysis;
- Appendix C: Detailed Impacts by Activity and Subunit; and
- Appendix D: Impacts to Timber Activities Discounted at Six Percent.

SECTION 2 | BACKGROUND

34. This section summarizes the study area and provides information on the land use activities considered in this analysis. The murrelet is a small seabird of the Alcidae family that forages in marine areas and nests in old-growth forests near the marine environment. The Proposed Rule describes the species and its habitat in detail.[20]

2.1 PROPOSED CRITICAL HABITAT DESIGNATION

35. The proposed critical habitat rule for the murrelet delineates 14 units across three States in terms of areas proposed for final critical habitat and areas proposed for exclusion from critical habitat according to section 4(b)(2) of the Act, collectively referred to in this analysis as the "study area."

36. According to GIS data provided by the Service, the 14 proposed critical habitat units comprise approximately 222,000 acres proposed for final critical habitat and 3.38 million acres proposed for exclusion from critical habitat according to section 4(b)(2) of the Act. In order to provide results of the economic analysis at a more refined geographic scale than the 14 units, this analysis identifies "subunits" by landowner type.[21] A graphical depiction of these subunits is presented in Exhibits 2-3 through 2-16, and information on their relative sizes is described in Exhibits 2-1 and 2-2. Importantly, although results are presented by landowner type, impacts as quantified are not necessarily borne by the landowner type describing the subunit. For example, impacts associated with the "California Department of Parks and Recreation" subunits are, in part, consumer surplus losses forecast to be borne by potential recreators on these land and not by the Department of Parks and Recreation itself.

[20] U.S. Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Marbled Murrelet; Proposed Rule, 71 FR 176, September 12, 2006.

[21] A number of methods to present more spatially refined results were considered in developing this analysis, including by census tract, and watershed. The decision-making process that led to the delineation of subunits by landowner type is described in a memorandum from Industrial Economics to the U.S. Fish and Wildlife Service dated January 29, 2007.

EXHIBIT 2-1 AREAS PROPOSED FOR FINAL CRITICAL HABITAT

UNIT	LANDOWNER (SUBUNIT)		UNIT AREA (ACRES)[1]
WASHINGTON			
1	Private • Timber companies (3) • Residential landowners (33)	Acres (% total) • 1,519 (86%) • 256 (14%)	1,775
2	Private • Timber companies (2) • Residential landowners (1) • Trust lands	Acres (% total) • 2,003 (92%) • 83 (4%) • 81 (4%)	2,168
	Lummi Nation		545
	The Nature Conservancy		502
	Co-owned: Lummi Nation and The Nature Conservancy		21
3	Private (Primarily timber companies, some small residential landowner parcels)		18,822
	Grays Harbor County		1,565
	Washington State Parks and Recreation Commission (Cape Disappointment State Park)		359
	U.S. Bureau of Land Management (Cape Disappointment State Park)		1,151
Subtotal Washington			*26,907*
OREGON			
4	Private timber company (1)		374
	State of Oregon Department of Forestry		69,231
5	State of Oregon Department of Forestry		1,063
6	State of Oregon Department of Forestry		12,079
Subtotal Oregon			*82,747*
CALIFORNIA			
11	Private timber company (1)		651
12	California Department of Fish and Game		923
	California Department of Parks and Recreation (Grizzly Creek State Park and Humboldt Redwood State Park)		39,954
	Humboldt County (Grizzly Creek State Park)		167
13	Private[2]		1,043
	California Department of Parks and Recreation (Russian Gulch State Park, Montgomery Woods State Park)		2,709
	California Department of Forestry and Fire Protection (Jackson Demonstration State Forest)		5,475
14	Private[2]		2,465
	California Department of Parks and Recreation		55,892
	San Mateo County		1,825
	City: Golden Gate National Recreation Area		978
Subtotal California			*112,081*
TOTAL AREA PROPOSED FOR FINAL CRITICAL HABITAT			**221,735**

Note: Totals may not sum due to rounding.
[1] The acreage estimates in this table are from the GIS data of proposed critical habitat boundaries provided to IEc by the USFWS on December 5, 2006.
[2] We are awaiting GIS data from California counties regarding number and types of private landowners in these units.

EXHIBIT 2-2 AREAS PROPOSED FOR EXCLUSION FROM CRITICAL HABITAT DESIGNATION ACCORDING TO SECTION 4(B)(2) OF THE ACT

UNIT	LANDOWNER (SUBUNIT)	UNIT AREA (ACRES)[1]
WASHINGTON		
1	U.S. Forest Service	421,806
	Washington Department of Natural Resources	226,395
	Makah Nation	1,507
2	U.S. Forest Service	811,850
	Washington Department of Natural Resources	100,843
3	U.S. Fish and Wildlife Service	5,688
	Washington Department of Natural Resources	86,626
	The Nature Conservancy	6,122
Subtotal Washington		*1,660,836*
OREGON		
4	U.S. Forest Service	8,761
5	U.S. Forest Service	187,785
6	U.S. Forest Service	2,774
7	U.S. Forest Service	663,189
	State of Oregon	124
8	U.S. Forest Service	474
	State of Oregon	93,092
9	U.S. Forest Service	83,665
10	U.S. Forest Service	377,142
Subtotal Oregon		*1,417,006*
CALIFORNIA		
11	U.S. Bureau of Land Management	5,237
	U.S. Forest Service	252,329
12	Private	6,629
13	U.S. Bureau of Land Management	37,213
Subtotal California		*301,408*
TOTAL HABITAT AREA PROPOSED FOR EXCLUSION		**3,379,250**

Note: Totals may not sum due to rounding.
[1] The acreage estimates in this table are from the GIS data of proposed critical habitat boundaries provided to IEc by the USFWS on December 5, 2006.

37. Of the areas proposed for final critical habitat (described in Exhibit 2-1), approximately 85 percent are State-owned lands, and another 13 percent are commercial (primarily timber companies) and residential landowners. The remaining two percent are owned by counties and conservation groups. Exhibit 2-2 describes the 3.38 million acres proposed for exclusion according to section 4(b)(2) of the Act, of which approximately 85 percent are Federal and 15 percent are State lands. As described in Section 1, estimated impacts of murrelet conservation efforts in those areas proposed for exclusion according to section 4(b)(2) are discussed in Section 3 of this report, the remainder of the analysis focuses more specifically on those 222,000 acres the Service has proposed for final critical habitat.

38. The study area lands are generally characterized as forested stands containing large-sized trees, generally more than 32 inches (81 centimeters) in diameter with potential nesting

platforms at sufficient height, generally greater than or equal to 33 feet (10 meters) in height.[22]

2.2 THREATS TO THE MURRELET AND ITS HABITAT

39. Review of the Proposed Rule, Recovery Plan for the Marbled Murrelet (1997), and a representative sample of the consultation history identifies the following activities as potential conservation threats to the murrelet and its habitat:

- Timber Management;
- Development;
- Recreation;
- Transportation;
- Mining; and
- Fire Management.[23]

40. The extent of the various land use activities across the study area reflects the species' preference for unfragmented, old-growth forest lands. That is, the murrelet favors nesting in areas away from people and developed areas. This is evidenced by the fact that the majority of the lands of the study area (as described above) are rural forested landscapes primarily managed for timber harvest, public recreation (e.g., hiking and camping), or as conservation lands.

41. Each of the above land use activities is examined to determine how it may be modified to mitigate, compensate for, or avoid threats to the murrelet and its habitat in this analysis.

[22] U.S. Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Marbled Murrelet; Proposed Rule, 71 FR 176, September 12, 2006.

[23] U.S. Fish and Wildlife Service. 1997. Recovery Plan for the Threatened Marbled Murrelet (Brachyramphus marmoratus) in Washington, Oregon, and California. Portland, Oregon.

EXHIBIT 2-3 UNIT 1

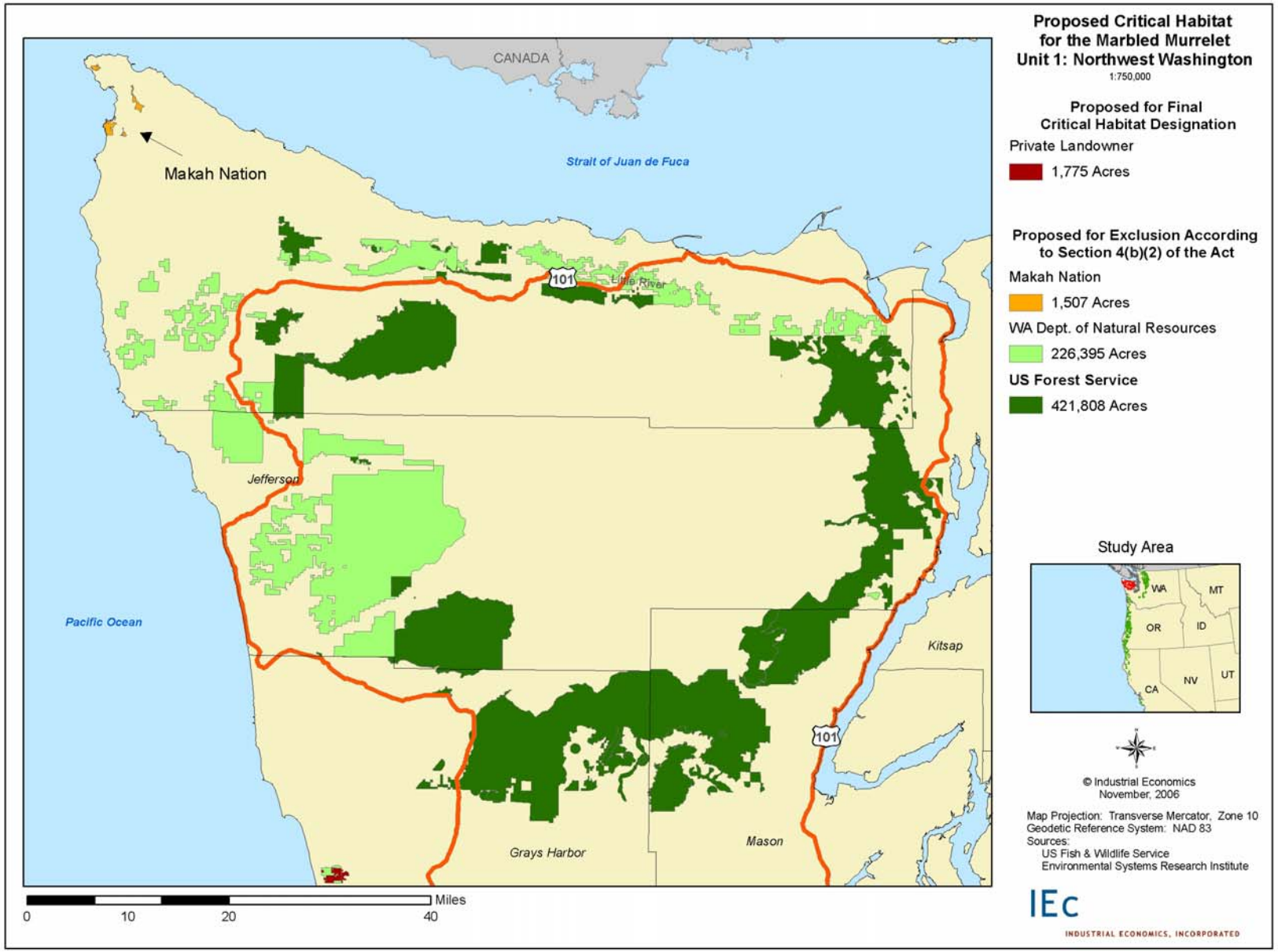
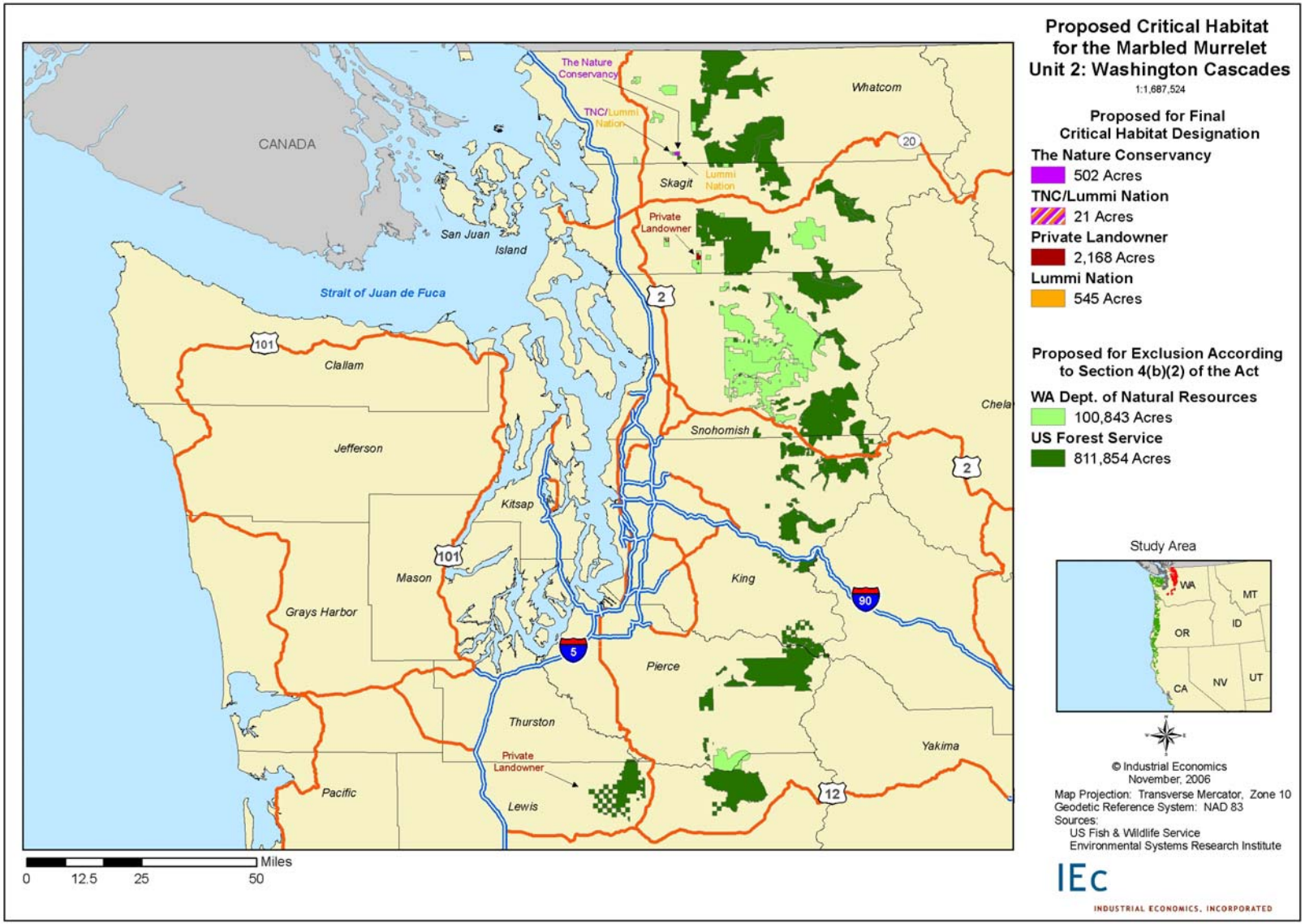


EXHIBIT 2-4 UNIT 2



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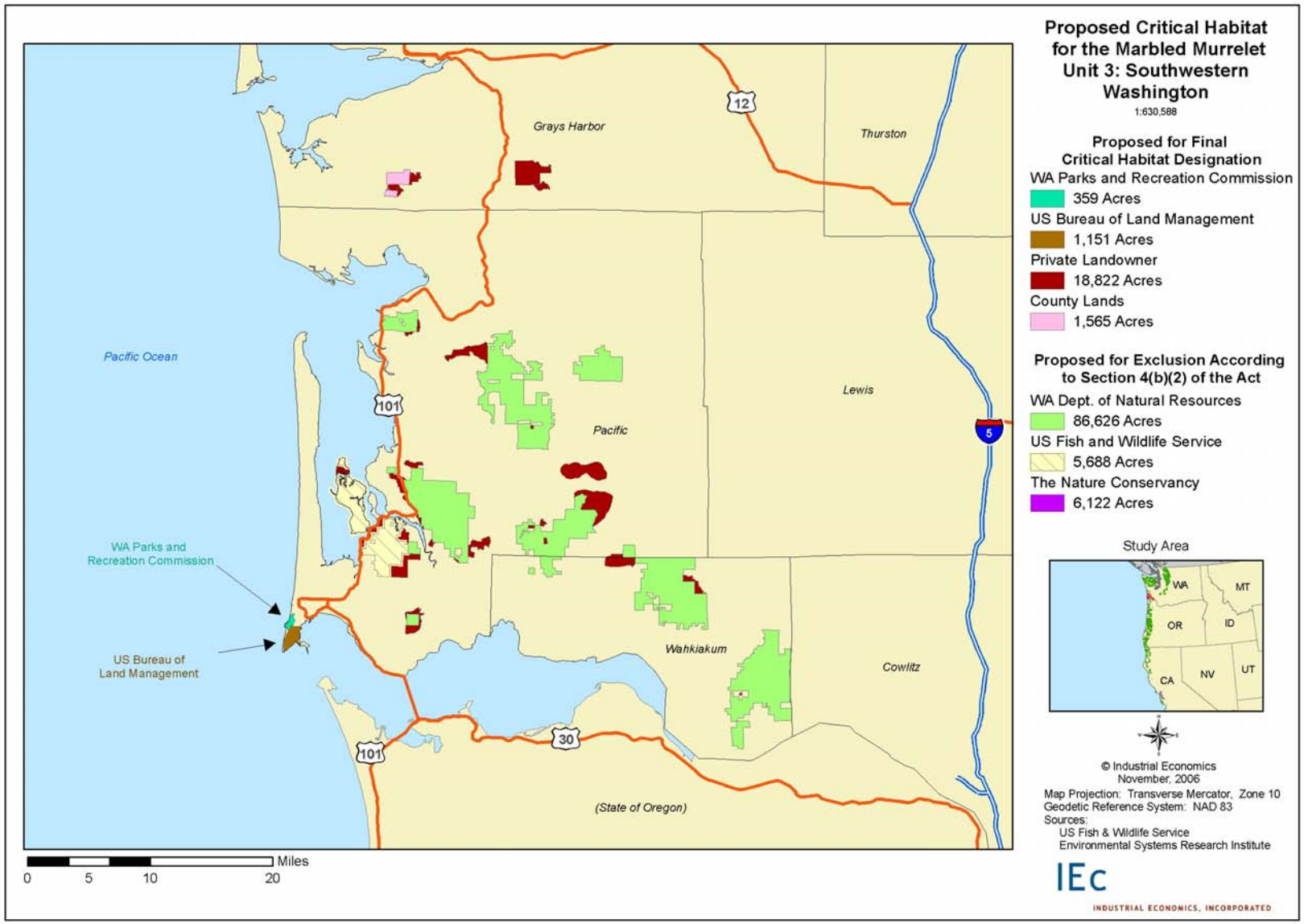

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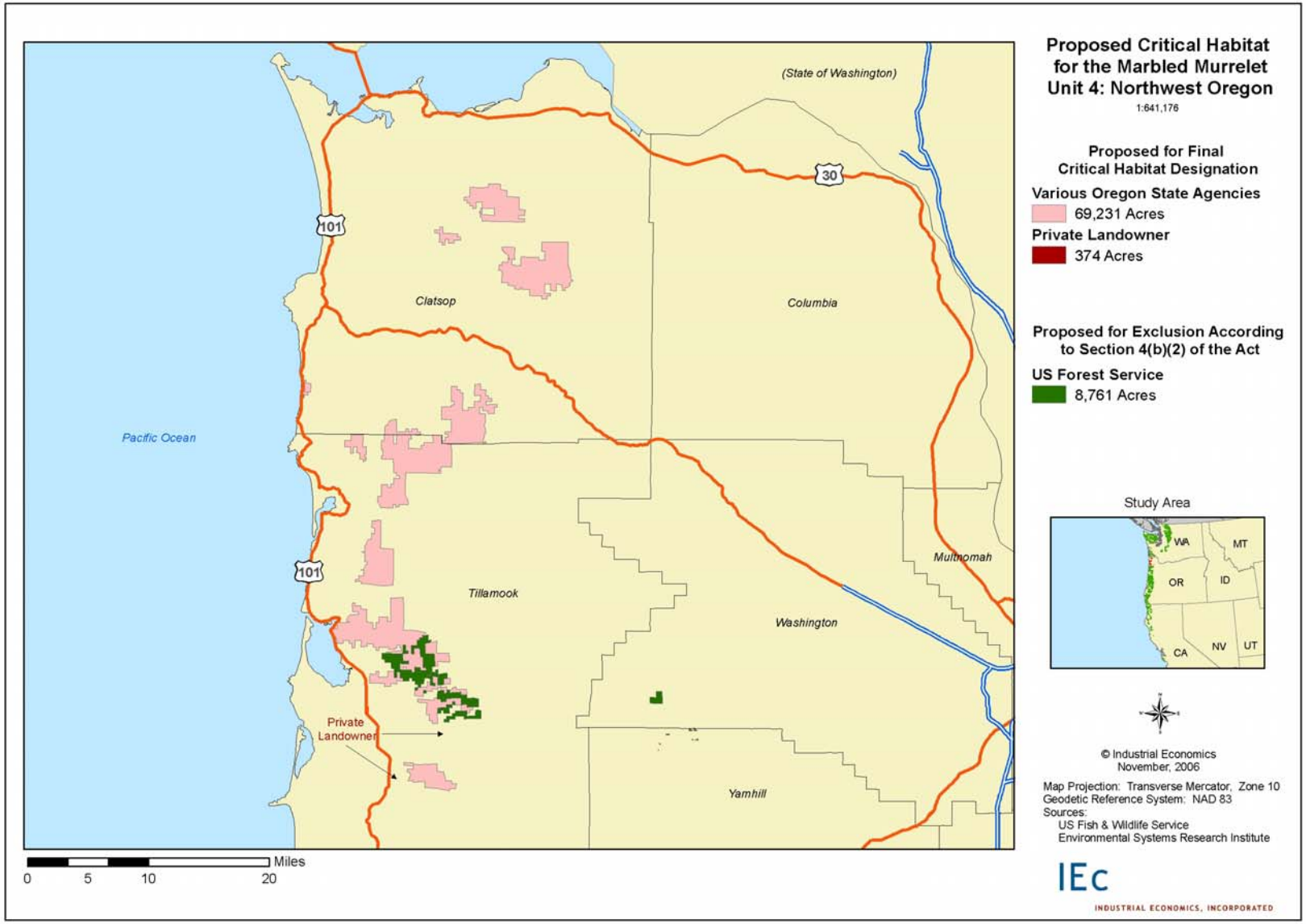

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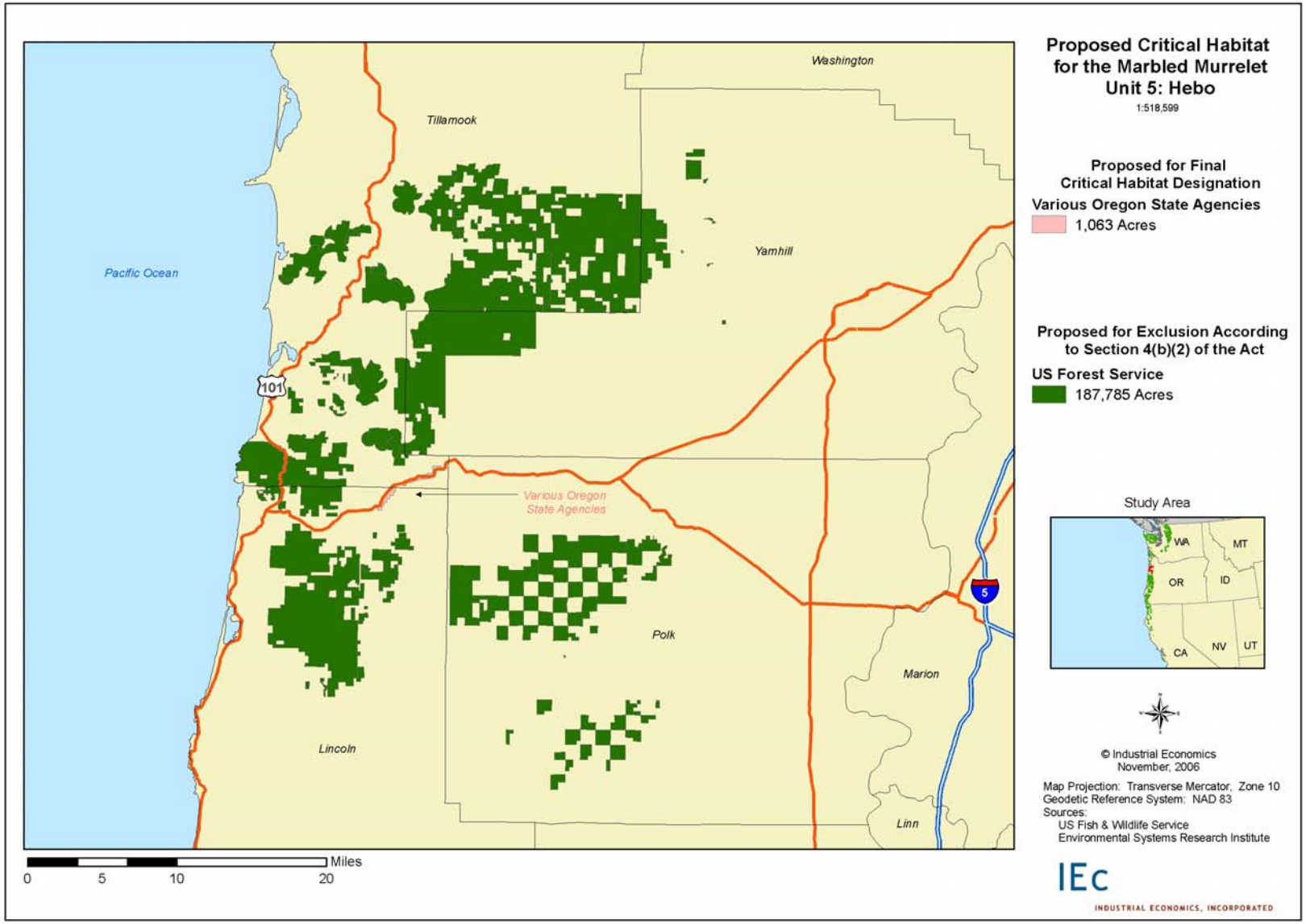

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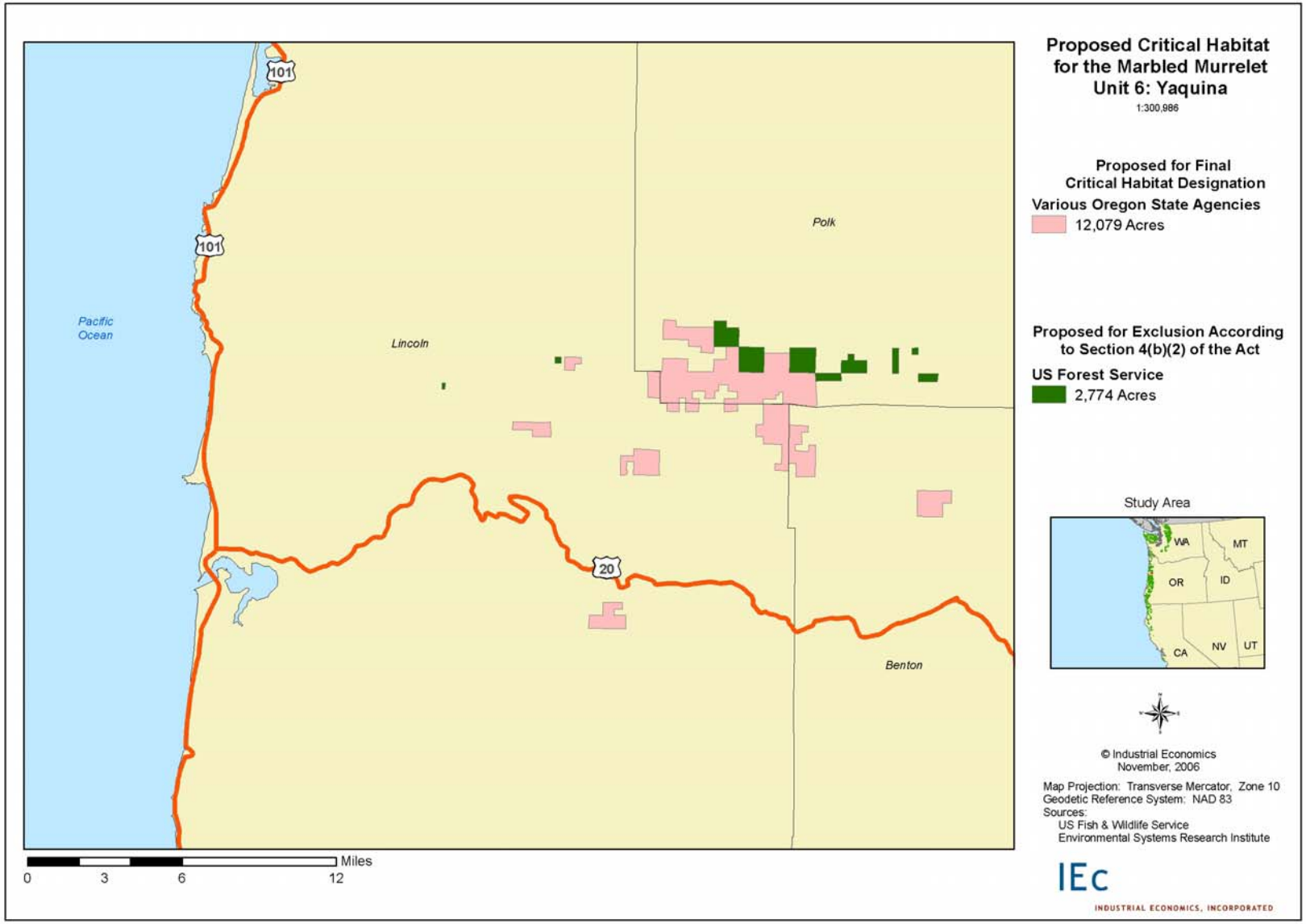


EXHIBIT 2-9 UNIT 7

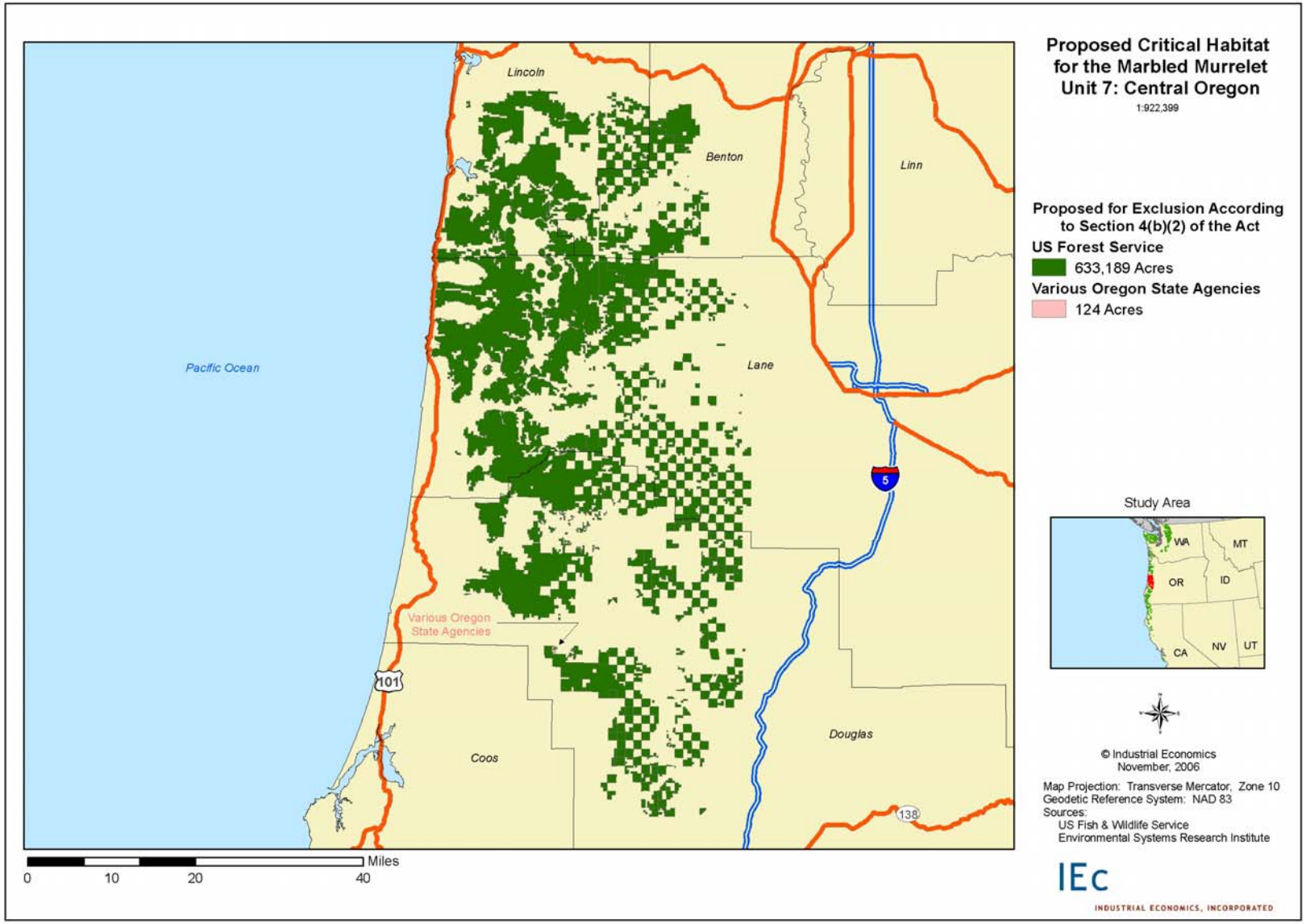


EXHIBIT 2-10 UNIT 8

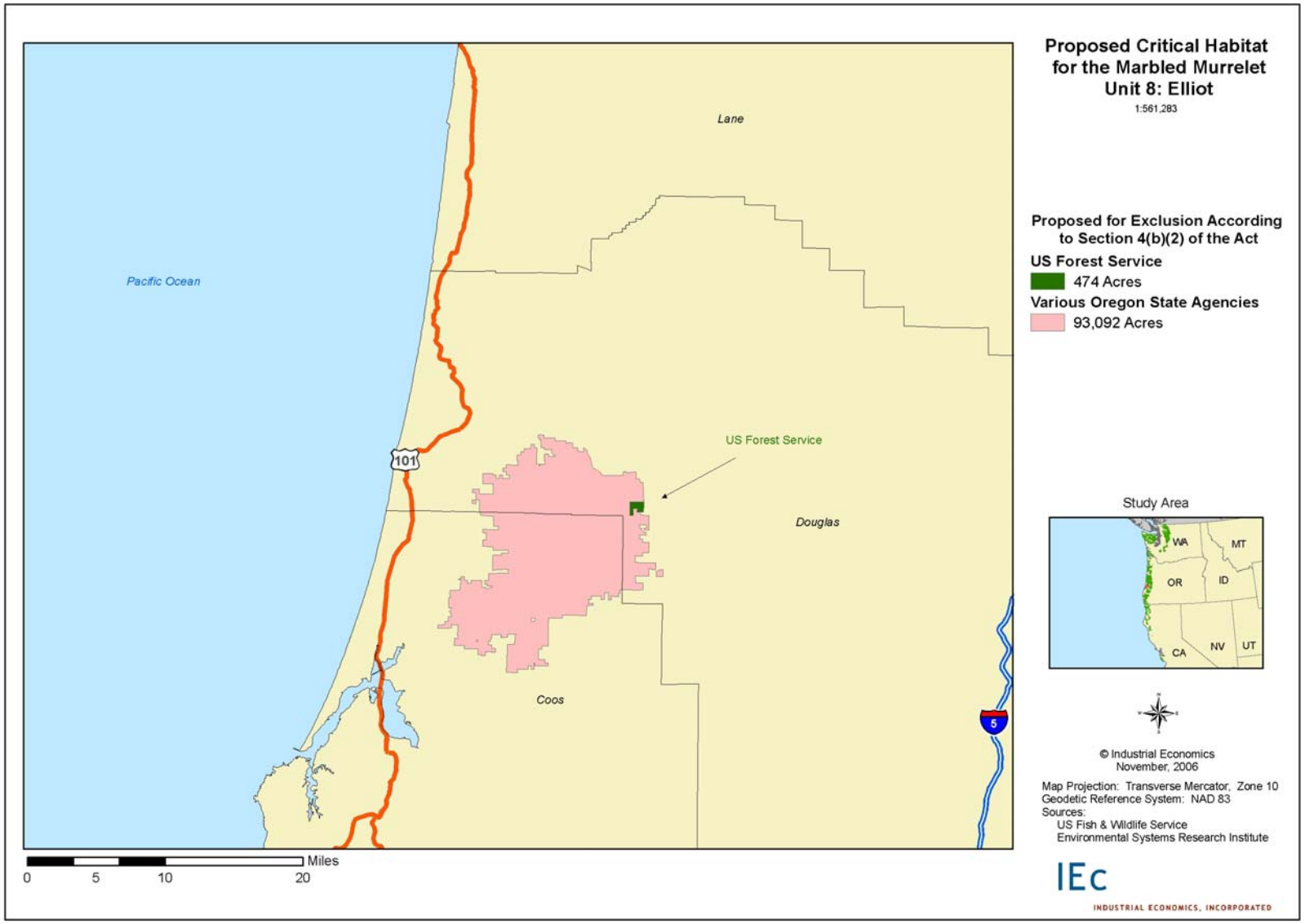


EXHIBIT 2-11 UNIT 9

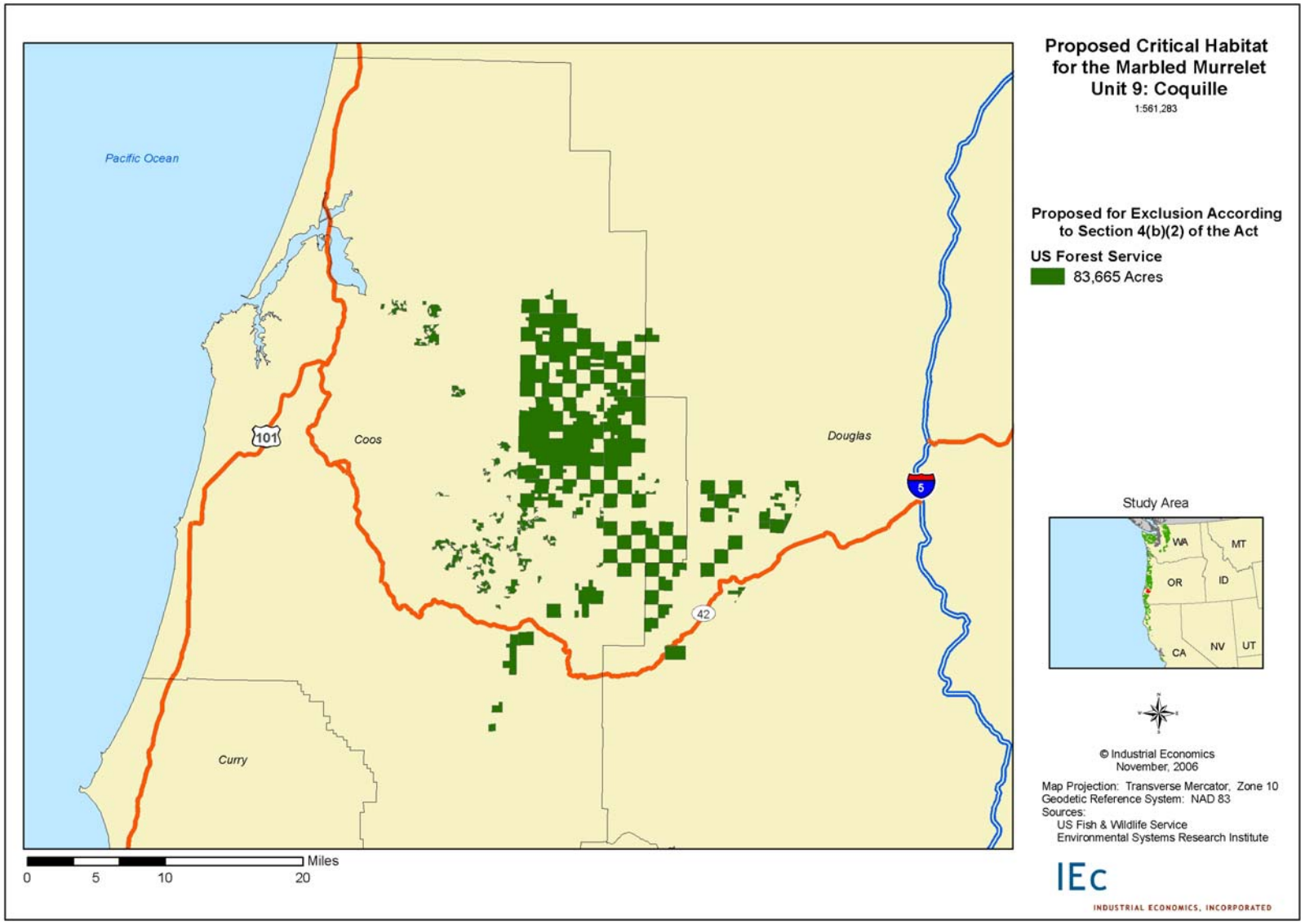


EXHIBIT 2-12 UNIT 10

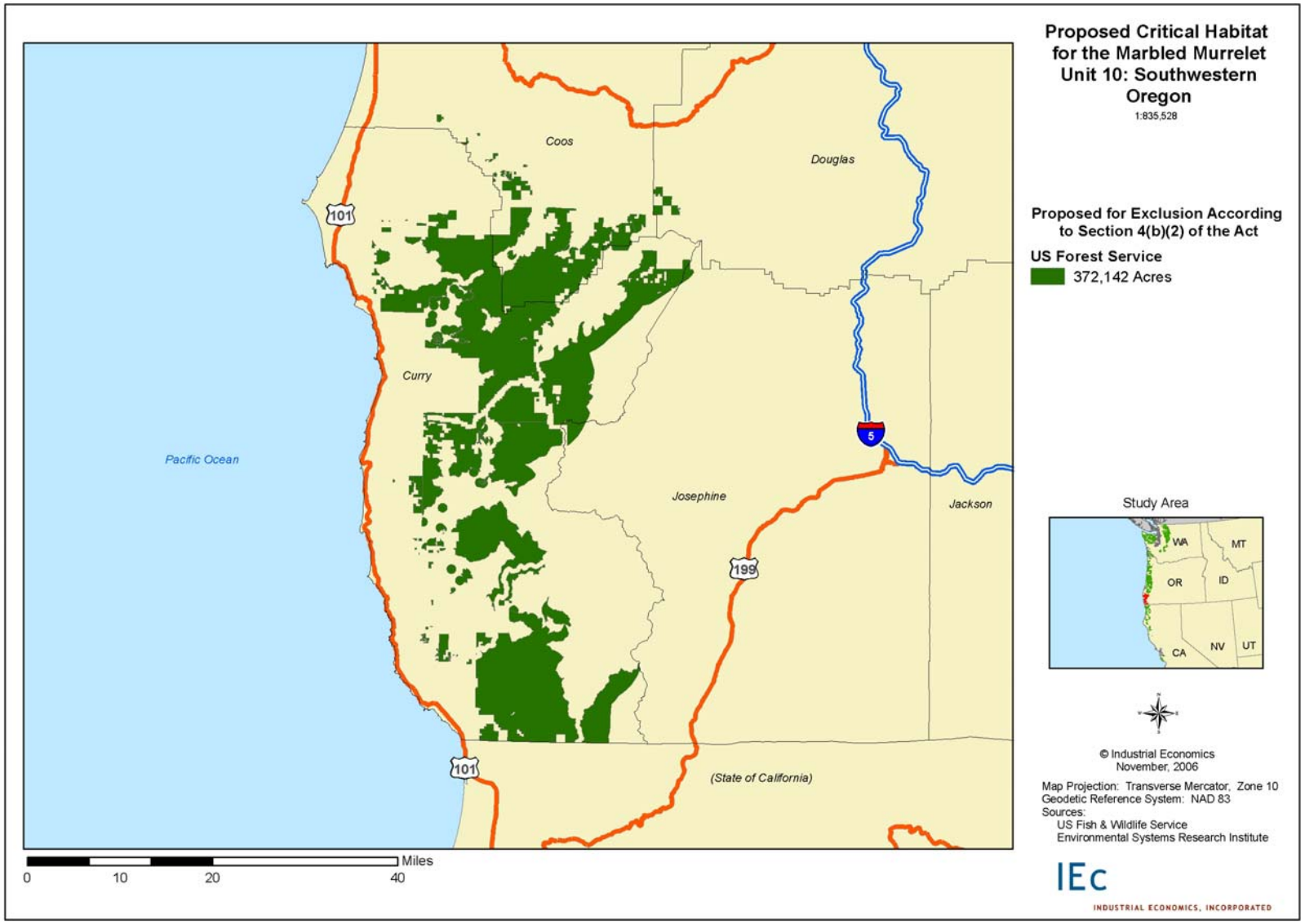


EXHIBIT 2-13 UNIT 11

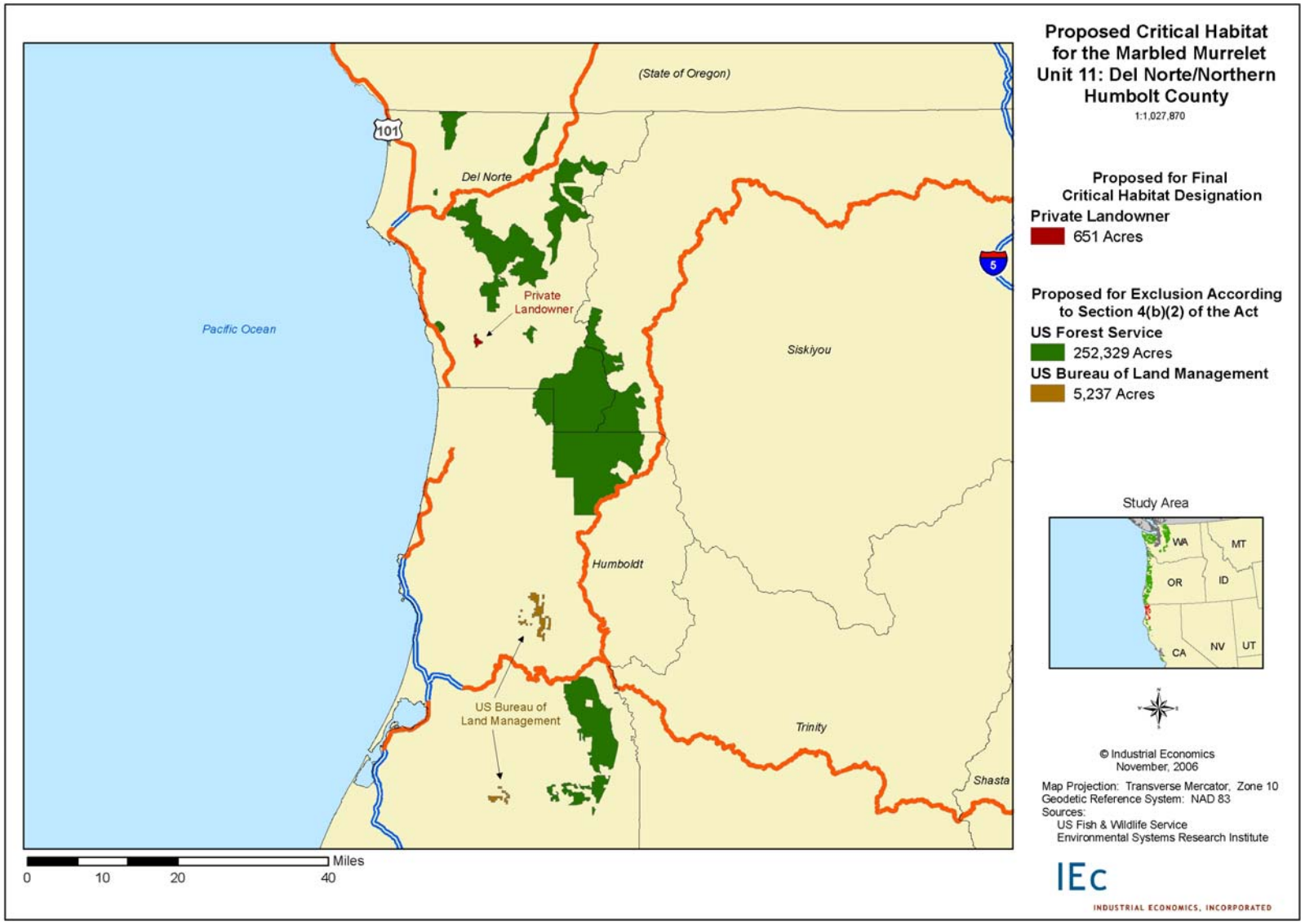


EXHIBIT 2-14 UNIT 12

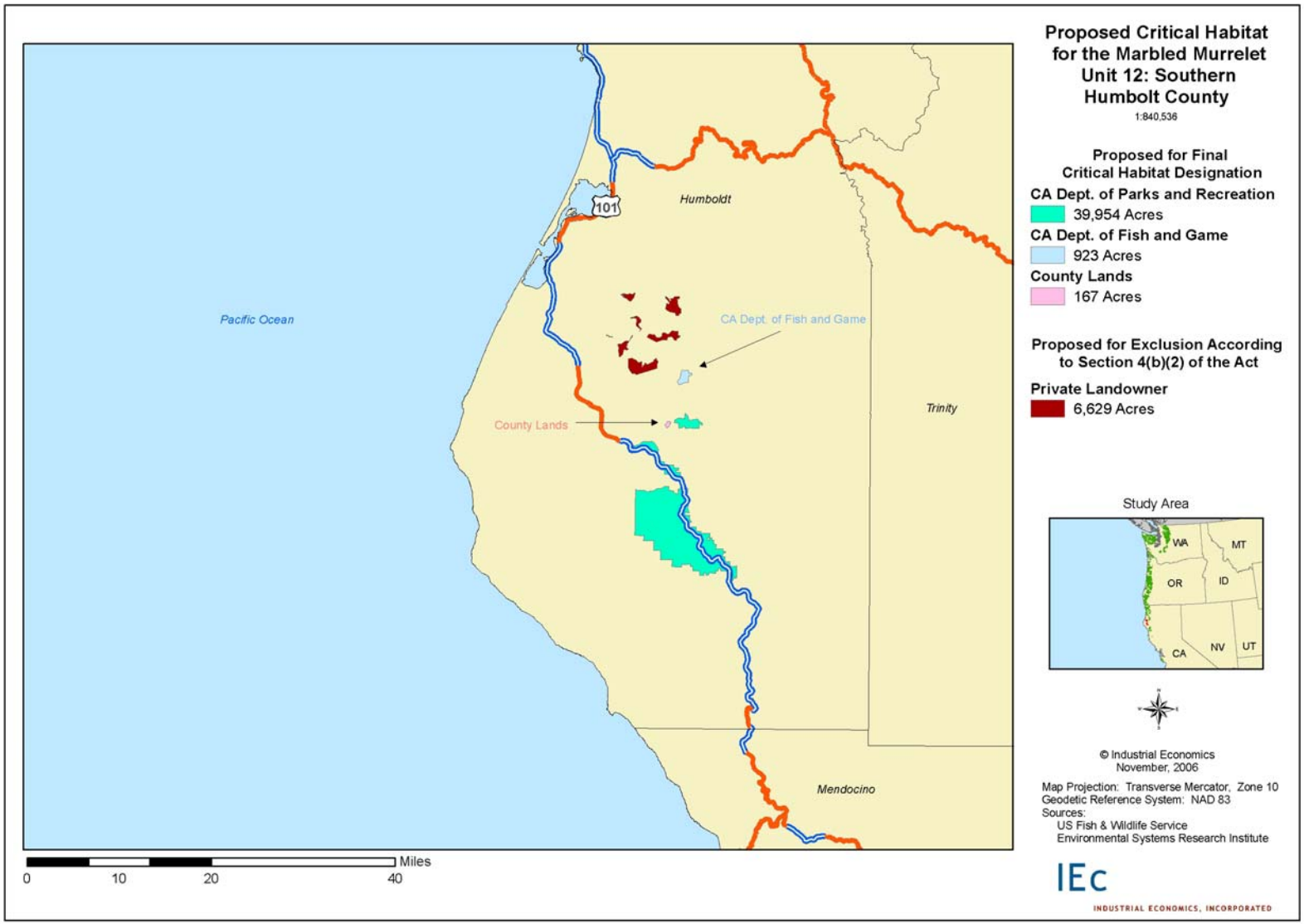


EXHIBIT 2-15 UNIT 13

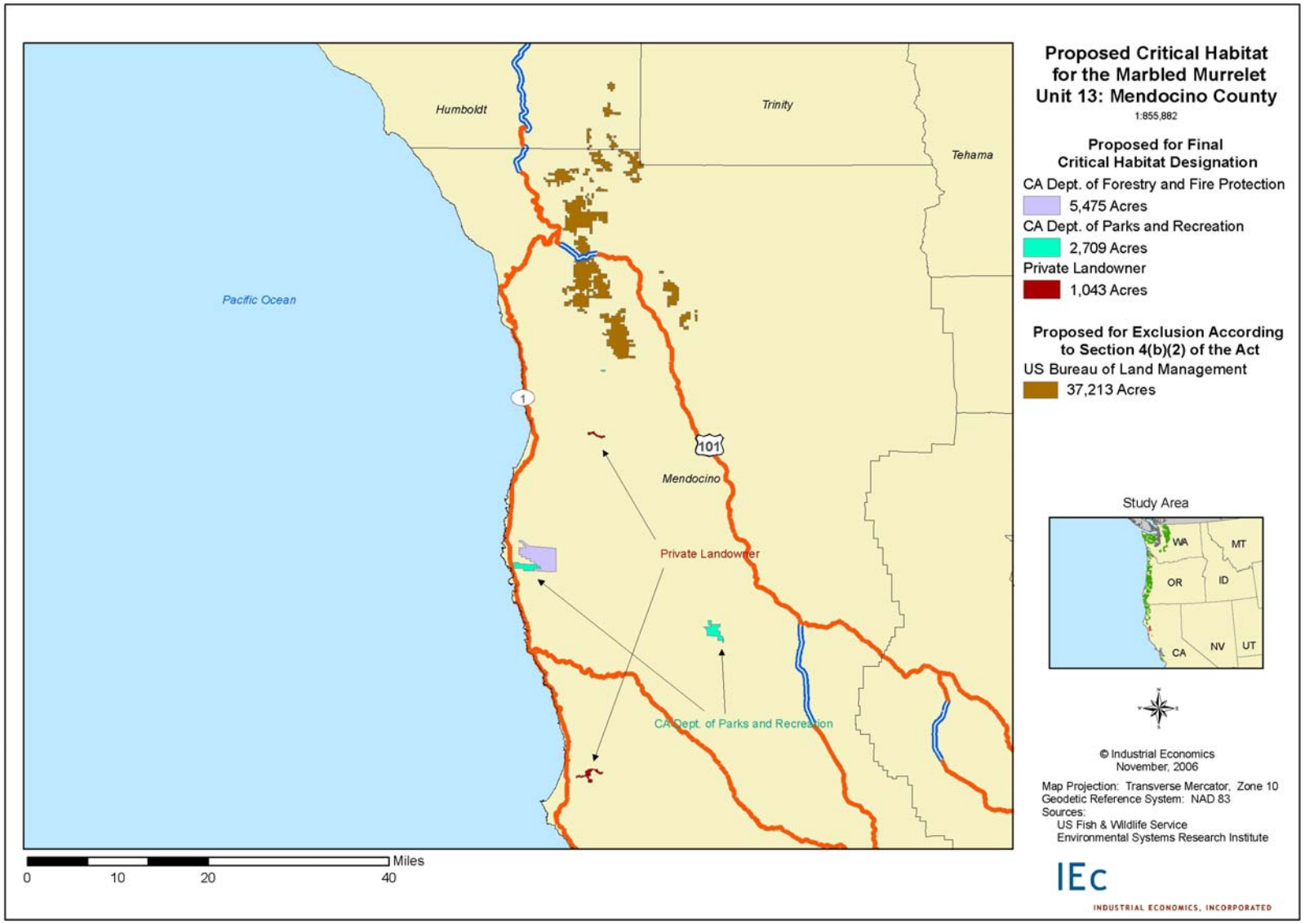
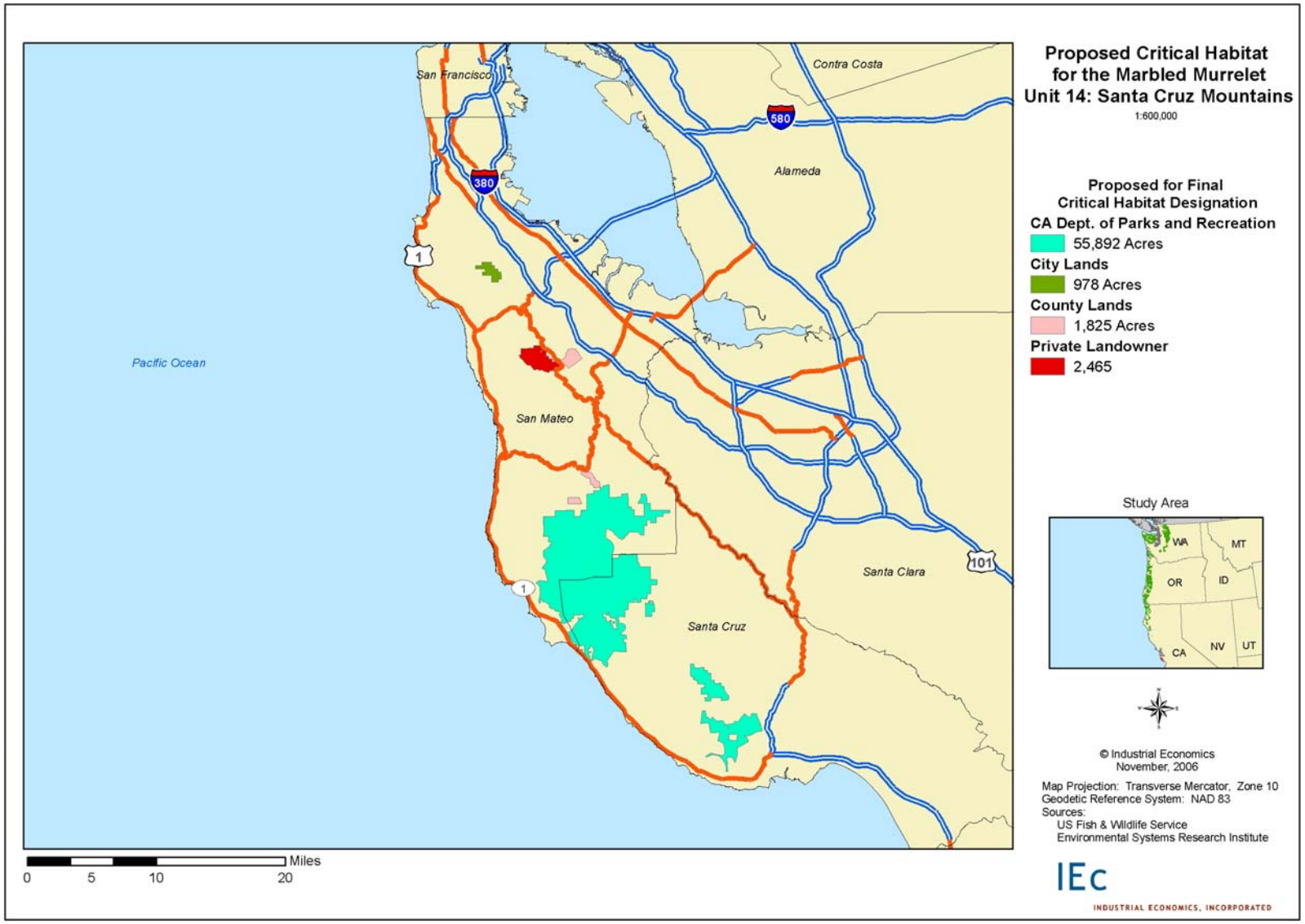


EXHIBIT 2-16 UNIT 14



SECTION 3 | AREAS PROPOSED FOR EXCLUSION ACCORDING TO SECTION 4(B)(2)

42. This section describes pre-designation (1992-2006) and post-designation (2007-2026) impacts of murrelet conservation on the approximately 3.38 million acres proposed for exclusion from critical habitat according to section 4(b)(2) of the Act. Specifically, this section discusses the past and future impacts of current management strategies in these areas, such as the Northwest Forest Plan (approximately 75 percent of the area proposed for exclusion is covered by the Northwest Forest Plan), and specific habitat conservation plans (HCPs) and forest management plans. This section is divided into two parts: (1) a summary of current management across the areas proposed for exclusion; and (2) a discussion of the methodology employed to arrive at a per acre cost for these areas.

43. While this section quantifies the impacts of murrelet conservation on the areas proposed for exclusion according to section 4(b)(2) of the Act, the remainder of this report focuses on the areas proposed for final critical habitat.

3.1 SUMMARY OF ECONOMIC IMPACTS

44. Pre-designation impacts include the decreased value of timberland associated with restrictions on harvest, and surveying and monitoring for the species.

45. Because these areas are proposed for exclusion due to sufficient existing management for the species, this analysis assumes that ongoing conservation efforts will continue in the future. Accordingly, post-designation impacts reflect the continuance of ongoing murrelet management in areas proposed for exclusion (i.e., monitoring, surveying, and restricting timber harvest in specified areas).

46. The landscape of the areas proposed for exclusion, and the murrelet conservation efforts described in the various management plans these areas, are sufficiently similar to allow development of a single per acre estimate of impacts on timber harvest activities stemming from murrelet conservation according to these plans. This per acre estimate is applied only to acres amenable to timber harvest absent conservation efforts for the marbled murrelet; that is, conservation lands or areas otherwise not suitable for timber harvest are not assigned land value losses associated with precluding timber harvest.

47. This analysis also estimates impacts on other activities. In Section 3.3.2, it discusses costs for monitoring and surveying. These impacts are minor in comparison to impacts on timber harvest, and are also calculated by acre. In Section 3.3.3.1, it discusses impacts on lands owned by the Pacific Lumber Company (PALCO). Section 3.3.3.2 discusses impacts on areas owned by the Service and the Nature Conservancy.

Pre-designation impacts in areas proposed for exclusion according to section 4(b)(2)

- Undiscounted: $118 million
- Present value applying a three percent discount rate: $140 million
- Present value applying a seven percent discount rate: $175 million

Post-designation impacts in areas proposed for exclusion according to section 4(b)(2)

- Undiscounted: $1.15 billion, or a per acre impact of $339.
- Present value applying a three percent discount rate: $387 million (annualized at $11.9 million), or an average per acre impact of $114.
- Present value applying a seven percent discount rate: $168 million (annualized at $11.9 million), or an average per acre impact of $50.

48. Estimated post-designation impacts in areas proposed for exclusion according to section 4(b)(2) of the Act are presented per acre in Exhibit 3-1. Total post-designation impacts are summarized by unit and landowner type in Exhibit 3-2.

EXHIBIT 3-1 POST-DESIGNATION IMPACTS PER ACRE

UNIT	LANDOWNER	ACREAGE	PER-ACRE IMPACT (PRESENT VALUE, 7%)	PER-ACRE IMPACT (ANNUALIZED, 7%)
1	US Forest Service	421,806	$50.00	$3.54
	WA Dept of Natural Resources	226,395	$50.00	$3.54
	Makah Nation	1,507	$50.00	$3.54
2	US Forest Service	811,850	$50.00	$3.54
	WA Dept of Natural Resources	100,843	$50.00	$3.54
3	US Fish and Wildlife	5,688	$1.83	$0.17
	WA Dept of Natural Resources	86,626	$50.00	$3.49
	The Nature Conservancy	6,122	$1.83	$0.12
4	US Forest Service	8,761	$50.00	$3.54
5	US Forest Service	187,785	$50.00	$3.54
6	US Forest Service	2,774	$50.00	$3.54
7	US Forest Service	663,189	$50.00	$3.54
	State of Oregon	124	$48.40	$3.40
8	US Forest Service	474	$50.00	$3.54
	State of Oregon	93,092	$48.40	$3.40
9	US Forest Service	83,665	$50.00	$3.54
10	US Forest Service	377,142	$50.00	$3.54
11	US Bureau of Land Management	5,237	$50.00	$3.54
	US Forest Service	252,329	$50.00	$3.54
12	Private	6,629	$108.00	$7.44
13	US Bureau of Land Management	37,213	$50.00	$3.54
	Total	**3,380,000**	$49.86	$3.53

EXHIBIT 3-2 SUMMARY OF ESTIMATED IMPACTS

UNIT	OWNER	ACRES	PRE-DESIGNATION IMPACTS			POST-DESIGNATION IMPACTS		
			UNDISCOUNTED	PRESENT VALUE, 3 PERCENT	PRESENT VALUE, 7 PERCENT	UNDISCOUNTED[1]	PRESENT VALUE, 3 PERCENT	PRESENT VALUE, 7 PERCENT
1	US Forest Service	421,806	$14,700,000	$17,300,000	$21,600,000	$143,000,000	$48,400,000	$21,100,000
	WA Dept of Natural Resources	226,395	$7,950,000	$9,380,000	$11,700,000	$77,000,000	$26,000,000	$11,300,000
	Makah Nation	1,507	$42,300	$48,400	$57,900	$513,000	$173,000	$75,300
2	US Forest Service	811,850	$28,200,000	$33,300,000	$41,600,000	$276,000,000	$93,200,000	$40,600,000
	WA Dept of Natural Resources	100,843	$3,540,000	$4,180,000	$5,230,000	$34,300,000	$11,600,000	$5,040,000
3	US Fish and Wildlife	5,688	$9,200	$10,900	$13,600	$18,400	$14,100	$10,400
	WA Dept of Natural Resources	86,626	$3,040,000	$3,590,000	$4,490,000	$29,500,000	$9,940,000	$4,330,000
	The Nature Conservancy	6,122	$9,900	$11,700	$14,600	$19,800	$15,200	$11,200
4	US Forest Service	8,761	$305,000	$359,000	$449,000	$2,980,000	$1,010,000	$438,000
5	US Forest Service	187,785	$6,530,000	$7,700,000	$9,630,000	$63,900,000	$21,600,000	$9,380,000
6	US Forest Service	2,774	$96,500	$6,870	$142,000	$943,000	$318,000	$139,000
7	US Forest Service	663,189	$23,100,000	$27,200,000	$34,000,000	$226,000,000	$76,100,000	$33,100,000
	State of Oregon	124	$4,190	$4,940	$6,190	$41,800	$14,000	$6,010
8	US Forest Service	474	$16,500	$19,400	$24,300	$161,000	$54,400	$23,700
	State of Oregon	93,092	$3,140,000	$3,710,000	$4,640,000	$31,400,000	$10,500,000	$4,510,000
9	US Forest Service	83,665	$2,910,000	$3,430,000	$4,290,000	$28,500,000	$9,600,000	$4,180,000
10	US Forest Service	377,142	$13,100,000	$15,500,000	$19,300,000	$128,000,000	$43,300,000	$18,800,000
11	US Bureau of Land Management	5,237	$8,780,000	$10,400,000	$12,900,000	$1,780,000	$601,000	$262,000
	US Forest Service	252,329	$182,000	$215,000	$268,000	$85,800,000	$29,000,000	$12,600,000
12	Private	6,629	$1,480,000	$1,720,000	$2,100,000	$2,620,000	$1,140,000	$713,000
13	US Bureau of Land Management	37,213	$1,290,000	$1,530,000	$1,910,000	$12,700,000	$4,270,000	$1,860,000
	Total	**3,380,000**	**$118,000,000**	**$140,000,000**	**$175,000,000**	**$1,150,000,000**	**$387,000,000**	**$168,000,000**
						Annualized	**$11,900,000**	**$11,900,000**

UNIT	OWNER	ACRES	PRE-DESIGNATION IMPACTS			POST-DESIGNATION IMPACTS		
			UNDISCOUNTED	PRESENT VALUE, 3 PERCENT	PRESENT VALUE, 7 PERCENT	UNDISCOUNTED[1]	PRESENT VALUE, 3 PERCENT	PRESENT VALUE, 7 PERCENT

Notes:

[1] To approximate impacts to land values, the value of all future timber harvest is calculated in perpetuity. This method does not allow for the calculation on an "undiscounted" impact, as that would be the annual lost timber harvest lost over an infinite number of years. Where the land value impact is an issue, this analysis therefore substitutes a one percent discount rate. As highlighted in Section 4 of this report, regional timberland appraiser currently apply a six percent discount rate in valuing timberlands.

[2] Totals may not sum due to rounding

3.2 BACKGROUND

49. The Service proposes approximately 3.38 million acres for exclusion from critical habitat for the murrelet under Section 4(b)(2) of the Act (or approximately 94 percent of the study area). Of the areas proposed for exclusion, approximately 85 percent are Federal lands and 15 percent are State lands.

50. According to the Proposed Rule, the areas proposed for exclusion according to section 4(b)(2) are so proposed because they are covered by existing management plans that provide management, protection, or enhancement of the habitat that is at least equivalent to that provided by a critical habitat designation. These existing management plans include:

- **The Northwest Forest Plan.** The Northwest Forest plan, which amended U.S. Forest Service and BLM land management plans, addresses murrelet conservation by protecting nesting habitat on Federal lands.
- **Makah Indian Forest Management Plan.** This plan developed by the Makah Indian Nation and the Bureau of Indian Affairs largely precludes timber harvest in known occupied marbled murrelet breeding sites.
- **Washington Department of Natural Resources HCP.** The HCP guides the development of management plans for multiple species on approximately 1.6 million acres of State trust forest lands. Murrelet management under this plan is similar to the Northwest Forest Plan.
- **Willapa National Wildlife Refuge and Ellsworth Creek Reserve.** Areas of the Willapa National Wildlife Refuge are designated as Research Natural Areas; activities within the area are therefore limited to conservation activities. Ellsworth Creek Reserve is in the process of developing a joint management and forest restoration plan.
- **Elliot State Forest HCP.** Elliot State Forest is in the process of developing a multi-species HCP. Under the current proposed HCP, a limited amount of harvesting would be permitted.
- **Pacific Lumber Company HCP.** This HCP establishes murrelet conservation areas.

A more detailed summary of the murrelet conservation efforts undertaken under these plans is provided in Exhibit 3-3.

EXHIBIT 3-3 MANAGEMENT PLAN SUMMARY

MANAGEMENT PLAN	MURRELET CONSERVATION IMPACTS ON TIMBER HARVEST	MURRELET MONITORING	MURRELET CONSERVATION IMPACTS ON OTHER ACTIVITIES
Northwest Forest Plan [1]	▪ If occupied, all existing and recruitment habitat within 0.5 mile radius is protected from harvest;	▪ Creates the marbled murrelet survey and monitoring plan with the intent to: o Identify specific forest habitat conditions important for nesting; o Establish a baseline of nesting habitat within Forest Plan area; o Monitor long-term habitat trends; o Monitor select samples of breeding population during the nesting season.	▪ Minimize construction of new roads ▪ Develop Fire Management Plan
Makah Indian Forest Management Plan [2]	▪ Creates "Mature Forest management zones" where only management activities that enhance old growth characteristics are permitted; and ▪ Harvest activities occur primarily in second growth stands.		▪ Future restoration of marbled murrelet habitat planned; ▪ Promote conservation and restoration of habitat affected by the 1991 Tenyo Maru Oil Spill.
Washington Department of Natural Resources HCP [3]	▪ Defers harvest until surveys could be completed; ▪ Identified marginal habitat is made available for harvest; ▪ All known occupied sites are protected.	▪ Survey and monitoring similar to Northwest Forest Plan; ▪ Conduct two-year habitat relationship study; ▪ Conduct inventory studies.	▪ Develop long-term Conservation Strategy (based on Recovery Plan)
Willapa National Wildlife Refuge and Ellsworth Creek Reserve [4]	▪ No harvest currently allowed.		▪ Current management only allows for non-destructive activities such as research, study, observation, monitoring, and educational activities. No impacts to these activities are expected. ▪ Developing a joint Forest Restoration and Management Plan

MANAGEMENT PLAN	MURRELET CONSERVATION IMPACTS ON TIMBER HARVEST	MURRELET MONITORING	MURRELET CONSERVATION IMPACTS ON OTHER ACTIVITIES
Elliot State Forest HCP [5]	▪ Under the terms of the Incidental Take Permit, a minimum of 4,000 acres of mapped habitat will be subject to regeneration harvest, according to the following schedule: o **Decade 1:** 1,200 acres o **Decade 2:** 1,000 acres o **Decade 3:** 1,000 acres o **Decade 4:** 800 acres o **Decade 5:** 0 acres ▪ An additional 2,800 acres may be harvested subject to creation of suitable replacement habitat.	▪ Survey and monitoring similar to Northwest Forest Plan;	▪ Seasonal restrictions to minimize disturbance to habitat (i.e., prohibit aircraft from flying within 1,320 feet, prohibit the use of explosives, etc.); ▪ Funding of murrelet conversation research at $200,000 per year for the first five years of the plan and $100,000 per year for the following five years.
Pacific Lumber Company HCP [6]	▪ Creates 11 murrelet conservation areas covering 6,529 acres in which timber harvesting is prohibited; ▪ Create 300 foot buffers around old-growth habitats		▪ Active roads within murrelet conservation areas may be used; ▪ Game hunting may continue during appropriate seasons. ▪ Minimize disturbance where possible; ▪ Development of borrow pits and rock material sources allowed during the first five years.

Source:

[1] US Forest Service, Standards & Guidelines for Management of Habitat for Late-Successional Old Growth Forest Related Species Within the Range of the Northern Spotted Owl, Attachment A to Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl; April 1994.

[2] U.S. Fish and Wildlife Service, Makah Forest Management Plan 1999-2008 for the Makah Indian Reservation, Formal Consultation # 1-02-1999-F-0534 with the Bureau of Indian Affairs, September 9, 1999.

[3] U.S Fish and Wildlife Service, Washington Department of Natural Resources, Washington Department of Natural Resources Habitat Conservation Plan, Habitat Conservation Plan, September 1997.

[4] Proposed Rule, and The Nature Conservancy, Ellsworth Creek, accessed at: http://www.nature.org/wherewework/northamerica/states/washington/preserves/art12965.html

[5] U.S Fish and Wildlife Service, Oregon Department of Forestry, Elliot State Forest Habitat Conservation Plan, Habitat Conservation Plan, June 2006.

[6] U.S Fish and Wildlife Service, Bureau of Land Management, National Marine Fisheries Service, Habitat Conservation Plan for the Properties of the Pacific Lumber Company, Scotia Pacific Holdings Company, and Salmon Creek Corporation, Habitat Conservation Plan, February 1999.

3.3 ESTIMATING ECONOMIC IMPACTS

51. This analysis estimates an average per acre impact per activity for the conservation efforts taking place under the management plans described in Exhibit 3-3. These estimated impacts are as follows:

- **Timber land value.** Timber impacts are estimated by multiplying average timber volume harvested per acre (35.25 mbf) by timber value per mbf ($250.94) and the probability an acre of habitat proposed for exclusion will be harvested in any given year (0.04 percent). This results in an annual per acre impact of $3.37. The future value of foregone timber harvest in perpetuity is applied as a proxy for the component of the market value of the land associated with it's silvicultural use; this is $48 per acre assuming a seven percent discount rate (or $112 per acre assuming a three percent discount rate).[24] Timber land value losses are applied to all areas amenable to timber harvest. (See Section 3.3.1.)
- **Survey and monitoring.** Survey and monitoring costs are estimated to be between $0.03 to $0.19 per acre per year. These impacts are applied to all areas proposed for exclusion. (See Section 3.3.2.)
- **Research funding.** In addition to impacts from precluded timber harvest and additional survey and monitoring, PALCO contributed $1.5 million to murrelet-related conservation research under the terms of its HCP. These impacts are applied to PALCO's lands in Unit 12. (See Section 3.3.3.1.)

3.3.1 TIMBER HARVEST

52. To estimate a per acre impact to timber harvest, this analysis develops an average value of timber harvest on a per acre basis. To do this, it first develops an estimate of the average volume of timber (mbf) generated by one acre of forestland based on previous timber harvests (Exhibit 3-4). Second it estimates the average timber value per mbf based on previous timber sales (Exhibit 3-5). Third, absent specific information on age class and rotation status of the existing timber stands, this analysis estimates the probability that an acre would have been harvested in any given year absent murrelet conservation based on the average annual volume harvested (see Exhibits 3-6 and 3-7).[25] Multiplying the results of these three steps results in the average annualized value of timber per acre of harvestable timber. Calculating timber land values this way results in a homogenous annualized impact estimate across the acres forecast to be harvested for timber.

[24] To approximate impacts to land values, the value of all future timber harvest is calculated in perpetuity. This method does not allow for the calculation on an "undiscounted" impact, as that would be the annual lost timber harvest lost over an infinite number of years. Where the land value impact is an issue, this analysis therefore substitutes a one percent discount rate. As highlighted in Section 4 of this report, regional timberland appraiser currently apply a six percent discount rate in valuing timberlands.

[25] This method assumes that there is an equal probability that an acre will be harvested each year.

EXHIBIT 3-4 AVERAGE VOLUME OF TIMBER GENERATED PER ACRE

COUNTY	ACRES HARVESTED FOR SALE IN 2006	TOTAL VOLUME (MBF) SOLD IN 2006	VOLUME PER ACRE (MBF)
Clallam	537	12,821	23.88
Grays Harbor	56	2,979	53.20
Jefferson	92	3,231	35.12
Mason	371	4,921	13.26
Pacific	161	6,522	40.51
Snohomish	884	34,226	38.72
Skagit	1148	38,368	33.42
Wahkiakum	227	9,030	39.78
Whatcom	297	11,680	39.33
		Average	**35.25**

Note that volume obtained from an acre of timber is determined by a wide number of site-specific factors including tree size, species mix, and harvest method.

Source: Washington Department of Natural Resources, *2006 Annual Report: Timber Management Data*, 2006.

EXHIBIT 3-5 AVERAGE TIMBER VALUE PER MBF ($2007)

COUNTY OR NATIONAL FOREST	TOTAL VOLUME (MBF) PER SALE	TOTAL VALUE (PRICE NET OF OPERATIONS COST) OF SALE	VALUE PER MBF ($/MBF)
Clallam	4,180	$1,183,062	$283.03
Clallam	6,357	$1,393,583	$219.22
Clallam	1,221	$209,355	$171.46
Clallam	1,760	$371,946	$211.33
Clallam	333	$95,592	$287.06
Clallam	67	$21,558	$321.76
Elliott State Forest	276,908	$105,892,658	$382.41
Elliott State Forest	281,655	$94,168,019	$334.34
Gifford Pinchot National Forest	11,946	$440,865	$36.91
Gifford Pinchot National Forest	14,332	$2,695,986	$188.10
Grays Harbor	4,695	$1,623,419	$345.78
Mason	6,216	$2,855,748	$459.42
Mason	1,281	$616,032	$480.90
Mt Baker National Forest	173	$6,320	$36.43
Mt Baker National Forest	6,280	$1,049,937	$167.18
Olympic National Forest	5,495	$561,849	$102.24
Olympic National Forest	20,285	$2,645,680	$130.43
Pacific	7,353	$3,562,501	$484.50
Pacific	12,968	$2,437,102	$187.93
Pacific	2,603	$565,144	$217.11
Siskiyou National Forest	18,950	$2,408,181	$127.08
Siskiyou National Forest	28,081	$3,184,747	$113.41
Siuslaw National Forest	32,129	$5,326,838	$165.80
Skagit	3,985	$1,338,706	$335.94
Skagit/Whatcom	4,241	$1,899,672	$447.93
Suislaw National Forest	28,489	$5,331,418	$187.14
Umpqua National Forest	74,648	$11,867,318	$158.98
Umpqua National Forest	5,570	$753,999	$135.36
Wahkiakum	5,865	$1,432,805	$244.30
Whatcom	2,436	$721,686	$296.26
Whatcom	2,780	$1,443,575	$519.27
		Average	**$250.94**

Note: Washington State Department of Natural Resources sells the rights to harvest its timber. Timber sales transactions were used to approximate value per mbt (price net of operations cost). this represents the net value of the timber (amount a harvesting operation is willing to pay per mbf taking into account estimated operations cost).

Source:

Region 6 US Forest Service, *Timber Cut and Sold Reports for Calendar Years 2001-2006*, accessed at: http://www.fs.fed.us/r6/nr/fp/FPWebPage/FP70104A/FP70104A.htm on February 21, 2007.

Washington State Department of Natural Resources, *Board Sales Results 2005-2007,* accessed at: http://www.dnr.wa.gov/htdocs/fr/sales/results/results.html on February 9, 2007.

EXHIBIT 3-6 AVERAGE TIMBER ACRES HARVESTED ANNUALLY

NATIONAL FOREST	AVERAGE ANNUAL HARVEST
Gifford Pinchot National Forest	323 acres
Mt Baker-Snoqualmie National Forest	85 acres
Olympic National Forest	332 acres
Siuslaw National Forest	589 acres
Umpqua National Forest	520 acres
Siskiyou National Forest	587 acres
Total	**2,436 acres**

Source: Region 6 US Forest Service, *Timber Cut and Sold Reports for Calendar Years 2001-2006*, accessed at: http://www.fs.fed.us/r6/nr/fp/FPWebPage/FP70104A/FP70104A.htm on February 21, 2007.

EXHIBIT 3-7 PROBABILITY AN ACRE OF HABITAT PROPOSED FOR EXCLUSION WILL BE HARVESTED

CALCULATION	RESULT
Total acreage harvested annually (see Exhibit 3-6)	2,436 acres
Total habitat proposed for exclusion in these forests	2,557,446 acres
Total forest acreage	6,396,808 acres
Acres harvested annually located within areas proposed for exclusion ((Total habitat / Total forest acreage) x (Total harvested acreage))	974 acres
Probability an acre proposed for exclusion will be harvested in any given year ((Acres harvested annually within proposed for exclusion areas) / (Total habitat))	**0.04%**

Source: Region 6 US Forest Service, *Timber Cut and Sold Reports for Calendar Years 2001-2006*, accessed at: http://www.fs.fed.us/r6/nr/fp/FPWebPage/FP70104A/FP70104A.htm on February 21, 2007; IEc analysis.

53. Combining the information from Exhibits 3-4 and 3-5 yields a value of $8,840 per acre of harvestable timber (average volume per acre multiplied by average value per mbf). The foregone future value of the timber on the lands for which timber harvest is precluded is applied as a proxy for the land value associated with option value for timber harvest on that parcel. Impacts quantified are therefore the estimated reduction in total land value associated with restricting its future economic use as a timber resource.

54. To project the foregone timber harvest in perpetuity, the value of the timber on an acre ($8,840) is multiplied by the probability that the acre will be harvested in any given year (0.04 percent). This results in an annual loss associated with prohibiting timber harvest. This annual loss is then discounted in perpetuity to approximate the total value of the land associated with the timber resource.[26] This results in a present value impact of

[26] Land value impacts associated with restrictions on timber harvest are calculated assuming all future use of the land for timber harvest is precluded. While the decreased land value is calculated assuming timber revenues are lost in perpetuity,

approximately $48 per acre assuming a seven percent discount rate, or $3.37 per acre per year (this is $112 assuming a three percent discount rate). These impacts are only associated with those acres for which timber harvest is currently precluded for the benefit of the murrelet, which are described in Exhibit 3-2.

3.3.2 MONITORING

55. This analysis also applies a per acre cost for murrelet monitoring to all areas. The average annualized cost of surveying and monitoring is based on the estimated costs of the Northwest Forest Plan's Monitoring Program (see Exhibit 3-8).

EXHIBIT 3-8 ESTIMATED MONITORING COSTS PER YEAR ($2007)

ACTIVITY	YEAR 1	YEAR 2	YEAR 3	FOLLOWING YEARS
Develop standardized methods and protocol for surveying	$212,000	$73,000		
Population and demographic surveys			$485,000	$413,000
Total acres	2,552,200	2,552,200	2,552,200	2,552,200
Average per acre	$0.08	$0.03	$0.19	$0.16

Source: US Forest Service, Marbled Murrelet Effectiveness Monitoring Plan for the Northwest Forest Plan, February 1999, pg. 39.

Note: Year 1 refers to the first year of monitoring for the plan. For this analysis, year one is applied to the year the HCP was finalized, year two is the subsequent year, etc. For example, for the Northwest Forest Plan, year one is 1999, year two is 2000, year three is 2001, and following years are 2002-2026.

56. These estimated annualized impacts are divided by the 2,552,200 acres of marbled murrelet habitat protected under the Northwest Forest Plan, for an approximate per acre impact between $0.03 and $0.19 per acre depending on the year.[27] This per-acre estimate of monitoring for the murrelet is then applied to the entire area proposed for exclusion from critical habitat according to section 4(b)(2) of the Act and forecast over 20 years to estimate post-designation impacts.

the resulting estimate reflects an impact on land value that is expected to be experienced at the time the rule is made final. It is therefore an impact that is assumed to be experienced within a 20-year time frame.

[27] US Forest Service and US Bureau of Land Management, Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Succesional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl, 1994, Table 3&4-28.

3.3.3 IMPACTS ASSOCIATED WITH OTHER AREAS

3.3.3.1 Pacific Lumber Company Areas

57. In addition to impacts on timber activities and monitoring, areas owned by the Pacific Lumber Company (PALCO) and proposed for exclusion under section 4(b)(2) of the Act also bear impacts associated with funding murrelet-related conservation research. Under the HCP, PALCO agreed to provide $200,000 a year over the first five years of the plan (1999-2003) and $100,000 for the following five years (2003-2008) for a total contribution of $1.5 million.[28]

58. In addition, some limited gravel mining sites and hard rock quarries are located within the areas protected under the PALCO HCP. Under the terms of the HCP, mining activities are allowed to continue at these sites subject to seasonal restrictions requiring some additional planning on PALCO's part.[29] These restrictions include:

- No trees greater than 12 inches in diameter may be removed without consultation;
- No single new borrow pit area greater than two acres can be cleared without consultation;
- A maximum of two new borrow pit sites in any marbled murrelet conservation area without consultation;
- For the hard rock quarry (Quarry 1), blasting is limited to the period after September 15 and prior to March 24 of each year; and
- To the extent possible, PALCO will mitigate disturbance impacts at other times of the year.

These estimated impacts are applied only to lands owned by PALCO in unit 12.

3.3.3.2. Nature Conservancy and US Fish and Wildlife Areas

59. The Nature Conservancy and the Service own approximately 6,120 acres that have been proposed for exclusion. These 6,120 acres encompass Willapa National Wildlife Refuge and Ellsworth Creek Reserve. The Willapa National Wildlife Refuge is a Research Natural Areas in which activities are limited to research, study, observation, monitoring, and other educational activities. In general, activities are required to be non-destructive and maintain unmodified habitat conditions. The Ellsworth Creek Reserve is managed to protect and restore old-growth forest.

60. Thus, aside from murrelet monitoring, this analysis does not assume management of these lands are affected by murrelet conservation.

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[28] U.S Fish and Wildlife Service, Bureau of Land Management, National Marine Fisheries Service, *Habitat Conservation Plan for the Properties of the Pacific Lumber Company, Scotia Pacific Holdings Company, and Salmon Creek Corporation*, Habitat Conservation Plan, February 1999.

[29] Ibid.

CHAPTER 4 | TIMBER ACTIVITIES

61. This section addresses potential impacts to timber management activities resulting from marbled murrelet conservation efforts. Approximately 123,000 acres included in the areas proposed for final critical habitat (56 percent) are currently managed for timber harvest. The remaining area is predominantly owned by California Department of Parks and Recreation and is managed for conservation or recreation, as opposed to timber production. Approximately 66 percent of timberlands in the study area are publicly owned (State and county land management agencies) and 34 percent are privately owned (private timber companies and individuals). The largest land holders that actively manage for timber are: the Oregon Department of Forestry (81,310 acres), Weyerhaeuser (9,760 acres), and Big Creek Lumber Co. (6,116 Acres). Together, these three landowners account for 78 percent of the timber ownership in the areas proposed for final critical habitat.

62. Impacts to the timber industry resulting from murrelet conservation have historically resulted from prohibiting timber harvest in areas occupied by the murrelet, placing seasonal harvest restrictions on lands buffering occupied areas, developing species management or habitat conservation plans (HCPs), and murrelet surveying and monitoring efforts.

63. Post-designation impacts on timberlands are forecast according to two scenarios to account for the uncertainty associated with how these areas may be managed for the murrelet in the future:

- **Scenario 1** impacts reflect the continuance of on-going and currently planned conservation efforts, including existing harvest prohibitions and restrictions, and survey and monitoring efforts.
- **Scenario 2** quantifies upper bound impacts of murrelet conservation by assuming that timber harvest is precluded across the entire area proposed for final critical habitat. In past consultations and forest management plans, instances have occurred where tree stands found to be occupied by the murrelet have discontinued timber harvest for the purpose of murrelet conservation. Absent information regarding with what frequency and distribution the murrelet may occupy the areas proposed for final critical habitat, Scenario 2 assumes that murrelet occupy the entire area proposed for final critical habitat, and therefore that harvest will be prohibited. While this scenario is uncertain, there is a possibility for the species to occur across the entire area. This scenario therefore

represents a true upper bound. These scenarios and their underlying assumptions are discussed in more detail in Section 4.2.

64. Total pre- and post-designation impacts to timber activities are summarized below and described and contextualized in the remainder of this section.[30]

Pre-designation impacts in areas proposed for final critical habitat

- Undiscounted: $12.8 million
- Present value applying a three percent discount rate: $16.2 million
- Present value applying a seven percent discount rate: $21.4 million

Post-designation impacts in areas proposed for final critical habitat

- Undiscounted:
  - Scenario 1 - $63.3 million
  - Scenario 2 - $1.34 billion[31]
- Present value applying a three percent discount rate:
  - Scenario 1 - $33.4 million (annualized $1.97 million)
  - Scenario 2 - $454 million (annualized $13.6 million)
- Present value applying a seven percent discount rate:
  - Scenario 1 - $20.8 million (annualized $1.92 million)
  - Scenario 2 - $176 million (annualized $6.41 million)

65. Exhibit 4-1 presents a summary of post-designation impacts according to the two scenarios by landowner within each of the proposed units. Total impacts to timber activities under Scenario 1 are roughly five to 12 percent of the impacts forecast under Scenario 2, depending on the discount rate applied. More than 48 percent of the total timber impacts occur within Unit 4, Northwest Oregon assuming a seven percent discount rate (49 percent of total high-end timber impacts are within Unit 4 assuming a three percent discount rate). Unit 4 is the largest unit proposed for final critical habitat, accounting for roughly 57 percent of all of the active timberlands.

[30] As described later in this Section, information about the value of harvestable timber and opportunity costs of capital to the timber industry (discount rates) is used to estimate current land values. Following the direction in OMB's Circular A-4 and direction provided by the Department of the Interior, this analysis applies three discount rates: three, seven, and zero (undiscounted) to calculate these land values, rather than the opportunity cost of capital specific to the timber industry. Personal communication with timberland appraisers in the Pacific Northwest suggests that a more appropriate industry-specific discount rate to apply is six percent. Regional timber appraisers generally apply discount rates between five and seven in the timber industry, while three is considered low (personal communication with Toby Atterbury, Atterbury Consultants, Incorporated, on March 13, 2007). While six percent is within the range of three to seven percent and therefore present value impacts are described within the bounds of this analysis, for comparison, Appendix D quantifies the timber impacts assuming an industry and region specific discount rate of six percent.

[31] To approximate land values associated with the timber resource, the value of all future timber revenue is calculated in perpetuity. This method does not allow for the calculation on an "undiscounted" impact (zero percent discount rate). Where the land value impact is an issue in Scenario 2, this analysis therefore substitutes a one percent discount rate.

66. Another 30 percent of the forecast impact to timber activities occurs in Unit 3, Southwestern Washington under Scenario 2 (the percentage is the same whether applying a seven or three percent discount rate). This unit accounts for 17 percent of all active timberlands. Accordingly, more than 80 percent of the timber impacts associated with murrelet conservation occur in these two units (Units 3 and 4).

67. Exhibit 4-2 highlights the per acre impacts within each unit. The impacts by unit are driven by the size of the Unit and by the relative value of the timber within. While, Units 4 and 3 are forecast to experience the greatest impacts regardless of scenario assumed, the relative impact ranking of the remaining units changes depending on the management assumption.

68. This remainder of this section is divided into five parts. The first characterizes the regional timber industry within the study area, including information related to the proportion of available timberlands and timber employment by county. The second section describes the assumption and analytic methodology applied to estimate impacts of murrelet conservation on timber activities according to two scenarios. The third and fourth sections describe the pre-designation and post-designation impacts to timber activities. The last section highlights assumptions and caveats related to the analysis.

EXHIBIT 4-1 POST-DESIGNATION IMPACTS BY UNIT AND LANDOWNER TYPE

UNIT	LANDOWNER TYPE	STATE	UNDISCOUNTED[1]		PRESENT VALUE 3 PERCENT		PRESENT VALUE 7 PERCENT	
			SCENARIO 1	SCENARIO 2	SCENARIO 1	SCENARIO 2	SCENARIO 1	SCENARIO 2
1	Private Landowner	WA	$0	$24,400,000	$0	$10,100,000	$0	$3,970,000
2	Private Landowner	WA	$0	$27,700,000	$0	$11,300,000	$0	$4,550,000
3	County Lands	WA	$314,000	$24,100,000	$240,000	$9,940,000	$178,000	$3,920,000
	Private Landowner	WA	$7,210,000	$311,000,000	$5,520,000	$126,000,000	$4,080,000	$49,500,000
4	Private Landowner	OR	$0	$4,480,000	$0	$1,900,000	$0	$796,000
	Various OR State Agencies	OR	$17,800,000	$660,000,000	$13,600,000	$220,000,000	$10,100,000	$94,300,000
6	Various OR State Agencies	OR	$749,000	$21,000,000	$574,000	$6,990,000	$425,000	$3,000,000
13	CA Dept. of Forestry and Fire Protection	CA	$12,500	$3,210,000	$7,560	$876,000	$3,960	$180,000
	Private Landowner	CA	$6,580,000	$48,200,000	$5,040,000	$15,100,000	$3,730,000	$5,560,000
14	Private Landowner	CA	$30,600,000	$211,000,000	$8,400,000	$51,800,000	$2,280,000	$9,990,000
		Total:	**$63,300,000**	**$1,340,000,000**	**$33,400,000**	**$454,000,000**	**$20,800,000**	**$176,000,000**

[1] To approximate land values, the value of all future timber harvest is calculated in perpetuity. This method does not allow for the calculation on an "undiscounted" impact, as that would be calculated as the annual lost timber harvest divided by the discount rate; the annual value divided by zero (for "undiscounted" impacts) would be undefined. Where the land value impact is an issue, this analysis therefore substitutes a one percent discount rate. As highlighted in the text of this section, regional timberland appraisers currently apply a six percent discount rate in valuing timberlands.

EXHIBIT 4-2 AVERAGE TIMBER IMPACTS PER ACRE

UNIT	TIMBER LAND ACRES	TOTAL SCENARIO 2 IMPACT (7%)	AVERAGE IMPACT PER ACRE
Unit 1: Northwest Washington	1,584	$3,970,000	$2,510
Unit 2: Washington Cascades	2,168	$4,550,000	$2,100
Unit 3: Southwestern Washington	20,387	$53,500,000	$2,620
Unit 4: Northwest Oregon	69,605	$95,100,000	$1,370
Unit 6: Yaquina - OR Dept. of Forestry	12,079	$3,000,000	$248
Unit 13: Mendicino County - Private Lands	1,262	$5,740,000	$4,550
Unit 14: Santa Cruz Mountains - Private Lands	16,108	$9,990,000	$620
Total:	123,193	$176,000,000	$1,430

4.1 PROFILE OF REGIONAL TIMBER INDUSTRY

69. This section presents timberland ownership by subunit, as well as county-specific harvest levels, values, and timber industry-related employment. The following 16 counties contain areas proposed for final critical habitat with actively managed timberlands:

- **Washington:** Whatcom, Skagit, Lewis, Grays Harbor, Pacific, and Wahkiakum Counties
- **Oregon:** Clatsop, Tillamook, Lincoln, Polk, and Benton Counties
- **California:** Del Norte, Humboldt, Mendocino, Santa Cruz, and San Mateo Counties

4.1.1 TIMBERLANDS WITHIN AREAS PROPOSED FOR FINAL CRITICAL HABITAT

70. Exhibit 4-3 illustrates the distribution of timberlands across the areas proposed for final critical habitat. More specifically, the timberland acreages by landowner type is highlighted in Exhibit 4-4. As highlighted in these exhibits, Unit 4 contains about 57 percent (roughly 69,600 acres) of the timberlands within the areas proposed for final critical habitat. This area is managed for timber harvest by the Oregon Department of Forestry. Approximately 67 percent of the full timberlands acreage is publicly-owned by States and counties.

71. The major landowners and the percent of their holdings to the total areas proposed for final designation of critical habitat are as follows:

	Acres	Percent Total
• Oregon Department of Forestry	81,310	66%
• Weyerhaeuser	9,760	8%
• Big Creek Lumber Company	6,116	5%

EXHIBIT 4-3 TIMBERLANDS WITHIN AREAS PROPOSED FOR FINAL CRITICAL HABITAT

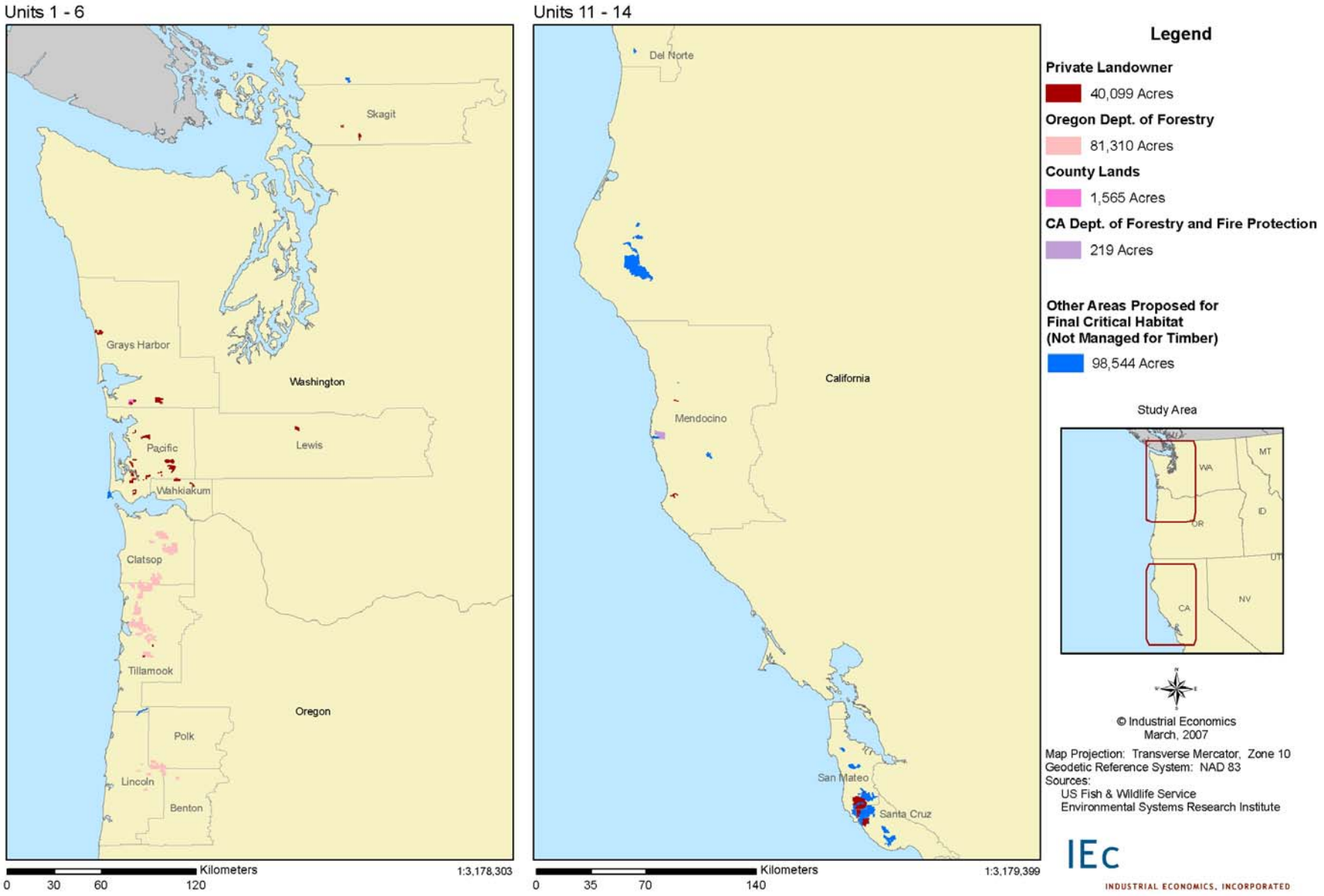

EXHIBIT 4-4 HARVESTABLE TIMBERLANDS WITHIN AREAS PROPOSED FOR FINAL CRITICAL HABITAT

UNIT	LANDOWNER TYPE	ACRES	OWNERS
1	Private Landowner	1,093	Western States Asset Management
		491	Kiroze Incorporated (326); Rayonier Timberlands Co. (100); Other Small Private Landowners (65)
2	Private Landowner	940	Weyerhaeuser
		1,063	Mid Valley Resources
		165	Small Private Landowners
3	County Lands	1,565	Grays Harbor County
	Private Landowner	3,574	Weyerhaeuser
		467	Green Diamond Resource Company (264); Rayonier (153); Other Small Private Landowners (49)
		3916	Pacific West Timber Company
		296	Green Diamond Resource Company
		5245	Weyerhaeuser
		3625	Multiple Timber Companies and Other Small Landowners
		1,699	Multiple Timber Companies and Other Small Landowners
4	Various Oregon State Agencies	26,891	OR Dept of Forestry- Astoria District (Clatsop State Forest)
		42,340	OR Dept of Forestry - Tillamook District (Tillamook State Forest)
	Private Landowner	374	Green Diamond Resource Company
6	Various Oregon State Agencies	12,079	Oregon Dept. of Forestry - Western Oregon District
13	CA Dept. of Forestry and Fire Protection	219	CA Dept. of Forestry and Fire Protection
	Private Landowner	740	Mendocino Redwood Company
		303	Hawthorne Timber Company (Campbell Group)
14	Private Landowner	6,116	Big Creek Lumber Company
		9,992	Small Private Landowners
	Total:	**123,193**	

3.1.2 REGIONAL ECONOMIC CHARACTERISTICS OF TIMBER INDUSTRY

72. Since the early 1990's and the promulgation of the Northwest Forest Plan, changes in forest management policy at the State and Federal level have limited the number of acres available for harvest, particularly on public lands.[32] The resulting economic impact to the forest products industry and industry-dependent communities varies by region; the overall

[32] Buttolph, Lita P.; Kay, William; Charnley, Susan; Moseley, Cassandra; Donoghue, Ellen M. 2006. Northwest Forest Plan—the first 10 years: socioeconomic monitoring of the Olympic National Forest and three local communities. Gen. Tech. Rep. PNWGTR- 679. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 84 p.

residual impacts of the contracting industry to the Pacific Northwest, however, have been significant.[33] Nonetheless, the timber industry is still important to the health of the regional economy.

73. Exhibit 4-5 provides county-level information on the annual revenue generated from timberlands harvest, estimated timberland acreage over the entire county, and percent of timberlands assigned to areas proposed for final critical habitat. Exhibit 4-6 highlights the percent of workers employed by the timber sector as a percent of total county-wide employment.

74. As highlighted in Exhibit 4-5, San Mateo County in California (Unit 14) has the most acres in areas proposed for final critical habitat as a percentage of total timberland acres; specifically, 20.7 percent of San Mateo timberlands are proposed for final critical habitat. San Mateo, however, has a few active timberland acres countywide and timber is a marginal industry in the county as evidenced in Exhibit 4-6. Approximately seven percent of Tillamook County, Oregon timberlands and 5.8 percent of Clatsop County, Oregon timberlands are also proposed for final critical habitat. Less than three percent of timberlands in each of the remaining counties is proposed for final critical habitat for the murrelet.

75. County-level employment in the forestry and logging sector varies. While over 20 percent of all employment in Wahkiakum County, Washington is within the timber industry, the County contains a relatively small portion of the timberland area that is proposed for final critical habitat (approximately one percent). The proportion of employment in five other Washington and Oregon counties ranges between two and five percent.

76. Because murrelet conservation may affect the greatest percentage of timberland in the counties of San Mateo, Tillamook, and Clatsop (Exhibit 4-5), this analysis also looks at the potential downstream impacts on employment in those counties; that is, employment in industries to which the forestry and logging sectors provide goods and services, primarily sawmills and woods products manufacturing.[34] In both Clatsop and Tillamook Counties employment in sawmills and wood manufacture is a relatively small percentage of total employment (1.4 percent and 3.0 percent respectively). In both counties, this level of employment has been steady as a percentage of total employment in recent years. In San Mateo County, CA, less that 0.01 percent of total employment is in the sawmills and wood products industry and this has been decreasing slightly in recent years.[35]

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[33] Raettig, Terry L.; Christensen, Harriet H. 1999. Timber harvesting, processing, and employment in the Northwest Economic Adjustment Initiative region: changes and economic assistance. Gen. Tech. Rep. PNW-GTR-465. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 16 p.

[34] The sawmills and wood preservation industry is classified according to the 2002 NAICS code 3211 (United States Census Bureau, NAICS Definitions, accessed at http://www.census.gov/ epcd/naics02/def/NDEF321.HTM#N3211).

[35] United States Census Bureau. Local Employment Dynamics, accessed at http://lehd.dsd.census.gov/led/datatools/qwiapp.html.

EXHIBIT 4-5 TIMBER INDUSTRY STATISTICS BY COUNTY

UNIT	COUNTY	MBF HARVESTED ANNUALLY[1]	VALUE OF HARVESTED ACRES[2, 3]	PER MBF VALUE	ESTIMATED TIMBERLAND ACRES BY COUNTY[4]	TIMBERLAND ACRES PROPOSED FOR FINAL CRITICAL HABITAT	PERCENT OF PROPOSED ACRES TO TOTAL HARVESTABLE ACRES
1	Grays Harbor	443,297	$119,221,682	$268.94	929,000	1,584	0.17%
2	Lewis	441,118	$134,040,745	$303.87	794,000	940	0.12%
	Skagit	121,823	$29,475,989	$241.96	381,000	1,228	0.32%
3	Grays Harbor	443,297	$119,221,682	$268.94	929,000	5,598	0.60%
	Pacific	277,422	$68,460,195	$246.77	505,000	13,090	2.59%
	Wahkiakum	96,463	$21,776,773	$225.75	128,000	1,699	1.33%
4	Clatsop	77,729	$19,312,820	$248.46	460,000	26,516	5.76%
	Tillamook	76,066	$10,140,265	$133.31	617,000	43,089	6.98%
6	Lincoln	6,692	$738,319	$110.33	547,000	3,983	0.73%
	Benton	12,486	$2,596,528	$207.96	318,000	1,680	0.53%
	Polk	396	$134,808	$340.42	262,000	6,416	2.45%
11	Del Norte	28,544	$13,118,055	$459.57	122,000	651	0.53%
13	Mendocino	109,548	$40,995,090	$374.22	854,000	1,043	0.12%
14	Santa Cruz	3,799	$1,802,958	$474.59	155,000	4,741	3.06%
	San Mateo	11,089	$5,811,351	$524.06	55,000	11,367	20.67%
	Totals:	**2,149,769**	**$586,847,258**	**$272.98**	**7,202,700**	**123,816**	**1.72%**

Notes:

[1] Washington Department of Natural Resources, "Timber Harvest By Ownership By County, 2001" Accessed at http://www.ofm.wa.gov/databook/pdf/lt02.pdf on March 2, 2007; Andrews, Alicia and Kutara Kristin, Oregon Department of Forestry, "Oregon's Timber Harvests 1849-2004", Accessed at http://www.oregon.gov/ODF/STATE_FORESTS/FRP/docs/OregonsTimberHarvests.pdf on March 2, 2007; California State Board of Equalization, "California Timber Harvest By County, 2004", Accessed at http://www.boe.ca.gov/proptaxes/pdf/yr3694to04.pdf on March 2, 2007.

[2] State of Washington Department of Revenue, "Forest Excise Tax Distribution for Fourth Quarter, 2001", Accessed at http://dor.wa.gov/content/taxes/timber/forst_statco.aspx on March 6, 2007; Oregon Department of Forestry, "2004 Revenue Distribution to Oregon Counties", Acessed from at http://www.oregon.gov/ODF/STATE_FORESTS/FRP/2004Payments.shtml#Timber_Related_Returns_by_County on March 6, 2007; California State Board of Equalization, "California Timber Harvest By County, 2004", Accessed at http://www.boe.ca.gov/proptaxes/pdf/yr3694to04.pdf on March 6, 2007.

[3] For WA only, 4% of all timber revenue generated on private lands goes to the county in which it was harvested. By using the annual excise tax values for 2001, the total value for harvested acres could be calculated.

[4] Gray, Andrew N.; Veneklase, Charles F.; Rhoads, Robert D. 2005. Timber resource statistics for non-national forest land in western Washington, 2001. Resour. Bull. PNW-RB-246. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 117 p.; Azuma, David L.; Bednar, Larry F.; Hiserote, Bruce A.; Veneklase, Charles F. 2004. Timber resource statistics for western Oregon, 1997. Rev. Resour. Bull. PNWRB-237. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 120 p.; Counting California, "Area Of Timberland And Ownerships In California, 2002" Accessed at http://countingcalifornia.cdlib.org/matrix/c71.html on March 7, 2007.

EXHIBIT 4-6 COUNTY-LEVEL EMPLOYMENT IN TIMBER INDUSTRY[1]

UNIT	COUNTY	STATE	COUNTY EMPLOYMENT IN TIMBER INDUSTRY[3]	COUNTY EMPLOYMENT IN ALL NAICS SUBSECTORS[2]	% EMPLOYMENT IN TIIMBER INDUSTRY
1	Grays Harbor	WA	498	22,665	2.2%
2	Skagit	WA	109	43,148	0.3%
	Lewis	WA	671	25,026	2.7%
3	Pacific	WA	123	5,889	2.1%
	Grays Harbor	WA	498	22,665	2.2%
	Wahkiakum	WA	116	563	20.6%
4	Clatsop	OR	283	15,112	1.9%
	Tillamook	OR	377	8,216	4.6%
6	Benton	OR	295	33,796	0.9%
	Lincoln	OR	132	16,744	0.8%
	Polk	OR	250	16,828	1.5%
11	Del Norte	CA	29	6,714	0.4%
	Humboldt	CA	557	47,027	1.2%
13	Mendocino	CA	441	31,213	1.4%
14	San Mateo[4]	CA	N/A	N/A	N/A
	Santa Cruz	CA	28	90,595	0.0%

Notes:

[1] Table includes NAICS-based statistics received from: U.S. Census Bureau, Local Employment Dynamics, Quarterly Workforce Indicators (Online) at http://lehd.dsd.census.gov/led/datatools/qwiapp.html. Data for Washington, Oregon, and California is current as of 2006 (Q1), 2005 (Q4), and 2004 (Q4) respectively.

[2] NAICS: North American Industry Classification System

[3] The timber industry constitutes industries included in the NAICS definition for "Forestry and Logging". Industries in this subsector grow and harvest timber on a long production cycle (i.e., of 10 years or more) accessed at http://www.census.gov/epcd/naics02/def/NDEF113.HTM.

[4] Industry is small enough to not register in census statistics.

4.2 ANALYTIC METHODOLOGY

77. This section describes how murrelet conservation may affect timber management, and the analytic methodology applied to translate these changes in management to economic impacts.

4.2.1 MURRELET CONSERVATION AND TIMBER MANAGEMENT

78. A set of murrelet conservation efforts associated with timber management activities was compiled through review of murrelet recovery planning documents, timber management plans, HCPS, and examples of past section 7 consultations. Identified murrelet conservation efforts related to timber management activities are described in Exhibit 4-7.

EXHIBIT 4-7 MURRELET CONSERVATION EFFORTS ON TIMBERLANDS

CONSERVATION EFFORT DESCRIPTION	EXAMPLES OF RECENT PRECENDENCE
Surveying, Monitoring, and Research - Surveying and monitoring efforts are patterned around timber harvests. Such efforts are often undertaken prior to timber sales or for timber sale planning purposes.[1]	Northwest Forest Plan U.S. Fish and Wildlife Service. 1997. Recovery Plan for the Threatened Marbled Murrelet (Brachyramphus marmoratus) in Washington, Oregon, and California. Portland, Oregon. U.S Fish and Wildlife Service, Washington Department of Natural Resources. "Washington Department of Natural Resources Habitat Conservation Plan." Habitat Conservation Plan. September 1997. U.S Fish and Wildlife Service, Bureau of Land Management, National Marine Fisheries Service. "Habitat Conservation Plan for the Properties of the Pacific Lumber Company, Scotia Pacific Holdings Company, and Salmon Creek Corporation." Habitat Conservation Plan. February 1999. U.S. Fish and Wildlife Service. "Olympic National Forest Program of Activities (2003-2008)." Programmatic Consultation # 01-03-2003-F-0833 with the Olympic National Forest. October 8, 2004. U.S. Fish and Wildlife Service. "Lost Man Creek Erosion Control and Disturbed Land Restoration Plan." Formal Consultation # 8-14-2006-2836 with Redwood National and State Parks. March 2006. U.S. Fish and Wildlife Service. "Route 101 Cushing Creek Realignment Project in Del Norte County, California." Formal Consultation # 01-14-1996-F-3 with the Federal Highway Administration. December 6, 2006.
Timber Harvest Prohibitions - State and Federal conservation recommendations specify occupied murrelet stands and surrounding 300 to 500 ft. buffers be precluded from timber harvest.[2]	Northwest Forest Plan U.S. Fish and Wildlife Service. 1997. Recovery Plan for the Threatened Marbled Murrelet (Brachyramphus marmoratus) in Washington, Oregon, and California. Portland, Oregon. U.S Fish and Wildlife Service, Bureau of Land Management, National Marine Fisheries Service. "Habitat Conservation Plan for the Properties of the Pacific Lumber Company, Scotia Pacific Holdings Company, and Salmon Creek Corporation." Habitat Conservation Plan. February 1999. U.S. Fish and Wildlife Service. "Headwaters Forest Reserve Resource Management Plan." Formal Consultation # 01-14-2001-963 with the Bureau of Land Management. February 6, 2004. U.S. Fish and Wildlife Service. "Olympic National Forest Program of Activities (2003-2008)." Programmatic Consultation # 01-03-2003-F-0833 with the Olympic National Forest. October 8, 2004. U.S. Fish and Wildlife Service. "Proposed Camp Grisdale Road Improvement

CONSERVATION EFFORT DESCRIPTION	EXAMPLES OF RECENT PRECENDENCE
	Project." Formal Consultation # 1-03-2006-F-0053 with the Federal Highway Administration. October 6, 2006.
Seasonal Restrictions - In some areas, particularly on lands managed by the Oregon Department of Forestry, a quarter-mile buffer is placed around occupied areas or likely nesting habitat where only seasonal harvest is allowed (September - March). These seasonal restrictions may inhibit timber managers from using roads that pass through the restricted area, consequently prohibiting access to areas beyond murrelet habitat.[3]	U.S. Fish and Wildlife Service. "Olympic National Forest Program of Activities (2003-2008)." Programmatic Consultation # 01-03-2003-F-0833 with the Olympic National Forest. October 8, 2004.
Timber Management Plan or HCP Development - Timber land managers have conducted murrelet studies and developed timber management plans or HCPs, which, if implemented, may provide conservation for the murrelet in the form of the above conservation efforts (surveying, setting aside areas from timber harvest, etc.).[4]	U.S. Fish and Wildlife Service. "Headwaters Forest Reserve Resource Management Plan." Formal Consultation # 01-14-2001-963 with the Bureau of Land Management. February 6, 2004. U.S. Fish and Wildlife Service. "Olympic National Forest Program of Activities (2003-2008)." Programmatic Consultation # 01-03-2003-F-0833 with the Olympic National Forest. October 8, 2004. U.S. Fish and Wildlife Service. "Hazard Tree Management Plan." Formal Consultation # 01-03-2005-FP-0439 with Mount Rainer National Park. January 27, 2006. U.S. Fish and Wildlife Service. "Lost Man Creek Erosion Control and Disturbed Land Restoration Plan." Formal Consultation # 8-14-2006-2836 with Redwood National and State Parks. March 2006.

CONSERVATION EFFORT DESCRIPTION	EXAMPLES OF RECENT PRECENDENCE

Notes:

[1] Personal communication with Steve Laam, District Forester for West Oregon District, Oregon Department of Forestry. February 22, 2007. Personal communication with Janet Webb, Chief Forester of Big Creek Lumber Company. March 2, 2007.

[2] Marbled Murrelet Operational Policy, 2004 Revision (Memo to State Forest Program from Ross Holloway, State Forest Program Director, Oregon Department of Forestry. Accessed at http://www.odf.state.or.us/stateforests/aop/docs/MaMu_Memo.pdf on March 16, 2007; Wildlife Habitat Analysis and Definitions (Appendix M), California Resources Agency. Accessed at http://resources.ca.gov/headwaters/eis/appen_m.pdf on March 16, 2007; "Emergency Rules for State Practices Board ", Washington State Code Reviser's Office. Accessed at http://www1.leg.wa.gov/documents/wsr/1997/10/97-10-005.htm on March 16, 2007.

[3] The Campbell Group (managers of lands owned by Pacific West Timber Company in Unit 3 and The Hawthorne Timber Company in Unit 13) claim that seasonal restrictions will prevent the access of acreage that is nearly twice the area that is within the boundaries of proposed critical habitat. Written communication from Angela Stringer, Wildlife Biologist, The Campbell Group, February 27, 2007.

[4] Written communication from Janet Webb, Chief Forester of Big Creek Lumber Company. March 2, 2007; Personal communication with Janet Webb, Chief Forester of Big Creek Lumber Company. February 23, 2007.

4.2.2 TIMBER ANALYSIS ASSUMPTIONS

79. To estimate impacts to timber management activities, this analysis employs two scenarios to bound the potential impacts, recognizing that there is significant uncertainty regarding the type and level of murrelet conservation that will be undertaken by timber landowners or managers.

4.2.3 METHODS APPLIED TO VALUE TIMBERLANDS

80. The value of land reflects its existing and potential economic uses, for example, development or timber harvest. In the case that the economic use of a parcel is limited, the value of that parcel is expected to decrease. Both Scenario 1 and 2 of this timber analysis assume some land is precluded from timber harvest: existing murrelet occurrences for which harvest is currently precluded in Scenario 1, and the entire timberland acreage (that is, areas currently being managed for timber harvest) in Scenario 2. Removing the potential for this land to be managed for timber harvest is therefore expected to reduce the land's market value. This analysis quantifies the increment of the total land value expected to be lost in the case that timber harvest is prohibited.

81. In addition to quantifying decreased land values associated with restricting its economic use (i.e., precluding timber harvest), this analysis quantifies other murrelet conservation efforts associated with timberland management. Publicly available information and personal communication with landowners and stakeholders were used to estimate average costs of surveying and monitoring for the species. The remainder of this section focuses on the specific methods employed to estimate timberland values.

SCENARIOS APPLIED TO ESIMTATE IMPACTS OF MURRELET CONSERVATION ON TIMBER

- **Scenario 1**- Scenario 1 quantifies the continuation of on-going and currently planned conservation efforts. This includes impacts related to existing harvest restrictions, HCP development, and survey and monitoring efforts. Scenario 1 assumes that conservation efforts will continue at a frequency with which they have been known to occur over the previous ten years. Scenario 1 represents a reasonable forecast of the post-designation impacts of murrelet conservation because much of the area proposed for final critical habitat is already part of existing critical habitat for the murrelet. It is therefore prudent to assume at the low end that the on-going conservation efforts for the murrelet will be all that is recommended in terms of murrelet conservation in the future.
- **Scenario 2** - The upper bound scenario assumes that timber harvest will be precluded in areas proposed for final critical habitat. This scenario accordingly quantifies decreases in land value associated with limiting economic use, i.e., discontinuing timber harvest. Scenario 2 is considered a upper bound forecast of post-designation impacts of murrelet conservation because it represents the conservative assumption that the areas proposed for final critical habitat are occupied by the murrelet and therefore unavailable for timber harvest. While we do not expect that this will occur in the entire area, the probability of this outcome is unknown.

This analysis quantifies impacts according to these scenarios for two reasons: 1) there is uncertainty associated with how timber stands may be managed for the purposes of murrelet conservation; and 2) absent information regarding with what frequency and distribution the murrelet may occupy the areas proposed for final critical habitat, scenario 2 assumes that murrelet occupy the entire area proposed for final critical habitat, and therefore that harvest will be prohibited. If surveys indicate that a particular stand planned for timber harvest within final critical habitat does not contain murrelet nests, as has occurred historically and is a likely possibility in the future, timber harvest would not be interrupted. Because biological models are not available to forecast in what specific stands across the study area murrelet will occur, we bound impacts assuming the area is fully occupied by murrelet. **Scenario 2 is therefore a true upper bound in this analysis, and impacts are expected to be somewhere between these two scenarios.**

Estimating Timber Land Values

82. This analysis assumes that precluding timber harvest on lands within final critical habitat reduces the lands' market value by some fraction. The timber value of land is approximated in this analysis by multiplying the volume of timber harvested per acre by the value (price net of operations cost) of the timber. The lost value of all future harvest

is calculated by projecting the value of the timber that would be harvested in perpetuity applying the following steps. For private timberlands, Atterbury Consultants, Incorporated was retained to appraise the timber value of these lands as described in Exhibit 4-9. Industrial Economics, Incorporated performed this analysis for lands owned by the Oregon Department of Forestry for which more data were publicly available for which more data were publicly available.[36] The steps in this calculation are described below.

- **Estimate number of harvestable acres**. First, the number of acres viable for harvest are isolated from the total acreage within the study area. Areas within the study area not forecast to be subject to timber harvest, and the respective reasons for this assumption, are highlighted in Exhibit 4-8. Various public land managers (the Oregon Department of Forestry and the California Department of Forestry and Fire Protection) provided information for acres where timber harvest will not occur due to: steepness of slope, existing roads, existing water bodies, riparian areas where harvest is restricted pursuant to State and Federal law unrelated to the murrelet, areas managed for habitat conservation, and areas where deed restrictions clearly preclude the harvest of timber for commercial purposes. For private lands, Atterbury Consultants, Incorporated used high-resolution aerial photography (taken in 2005 and 2006) to identify and remove non-production acres from their timber appraisal. As a result, 11 and 15 percent of public and private timberlands respectively were considered unviable for timber harvest from the approximately 123,000 total acres managed for timber.[37]

- **Quantify the volume of harvestable timber.** The volume of timber (in thousand board feet (mbf)) harvested over time from a parcel is a function of the forest inventory, age class, and timber management practices. The inventory (species mix) and age of an existing timber stand affects the value because these characteristics are correlated with tree size and therefore volume of timber that may be harvested. Harvest practices also dictate how much timber can be harvested on any given acre. For example, clear cuts may denude a parcel and produce more timber than selective harvesting practices, which specify the number of trees that may be harvested in a given unit of area. For private lands, Atterbury Consultants had information on the age class of timber stands and were therefore able to estimate the volume of timber harvested over time. For public lands, Industrial Economics employed information furnished by Atterbury Consultants to arrive at timber volumes for lands owned by Grays Harbor County and the California Department of Forestry and Fire Protection (1,584 and 219 acres respectively). The Oregon Department of Forestry sent Industrial Economics per-acre timber values for each forest district located in areas proposed

[36] For timberlands owned by Grays Harbor and the California Department of Forestry and Fire Protection (1,584 and 210 acres respectively), Industrial Economics employed county-level timber values from the Atterbury Consultants, Incorporated timber land appraisal.

[37] The 123,000 acres managed for timber represents approximately 56 percent of the total area proposed for final critical habitat.

for final critical habitat (timber volume and species mix reflected therein). To quantify the amount of harvestable timber, Industrial Economics calculated the probability of a given acre to be harvested based on the estimated acres harvested annually over the entirety of each forest district and the probability of that acre falling within the proposed critical habitat area.[38] Absent better information, this assumes that timber is harvested evenly across the forest over time.

- **Determine the value per mbf of the harvested timber.** Tree species have different values (price net of operations costs) as a result of multiple characteristics (e.g., strength, texture). Existing data regarding timber price and operations costs on private lands are applied as discussed in Exhibit 4-9 and summarized on an average per acre basis by county in Exhibit 4-11. These per county average timber values were also applied to timberlands owned by Grays Harbor County the California Department of Forestry and Fire Protection. For public lands in Oregon, timber values were calculated per forest district using published data from the Oregon Department of Forestry 's Northwest Forest Management Plan and personal communication with the Department.[39]
- **Calculate the present value of future foregone harvest.** The discounted value of future harvest rotations is calculated in perpetuity to estimate the affect on land value of precluding timber harvest. Per guidance from the Department of the Interior, this analysis discounts the timber impacts applying zero (undiscounted), three, and seven percent discount rates.[40] Regional timber experts, however, indicate that six percent is a more accurate rate that is generally being applied for timberland appraisals in the Pacific Northwest at present.[41] This analysis therefore provides the present value and annualized impacts applying a six percent discount rate in Appendix D.

[38] Annual harvest estimates were averaged from each Oregon Department of Forestry district's 10-year implementation plan. Each implementation plan reports annual estimated harvested acres from 2002-2011. (Astoria District Implementation Plan, Oregon Department of Forestry, March 2003. Pg. 23; Tillamook District Implementation Plan, Oregon Department of Forestry, March 2003. Pg. 25; West Oregon District Implementation Plan, Oregon Department of Forestry, March 2003. Pg. 26).

[39] This table can be found on pg. 5-12 in the chapter entitled "Implementation"; H Northwest Oregon State Forests Management Plan (Chapter 5, Implementation), Oregon Department of Forestry. January, 2001. Pg. 5-12. Accessed atHhttp://www.oregon.gov/ODF/STATE_FORESTS/docs/management/nwfmp/17-5-Implement_prn.pdfH on March 17, 2007H; and written communication with Barbara Lee, State Forests Policy and Planning Manager, Oregon Department of Forestry, March 13, 2007

[40] To approximate land values, the value of all future timber harvest is calculated in perpetuity. This method does not allow for the calculation on an "undiscounted" impact, as that would be the annual lost timber harvest lost over an infinite number of years, calculated as the annual losses divided by the discount rate. Dividing by a discount rate of zero (to estimate "undiscounted" impacts results in an undefined impact. Where the land value impact is an issue, this analysis therefore substitutes a one percent discount rate.

[41] Personal communication with Toby Atterbury, President, Atterbury Consultants, Incorporated on March 13, 2007.

EXHIBIT 4-8 AREAS WITHIN PROPOSED FINAL CRITICAL HABITAT THAT ARE NOT ACTIVELY MANAGED FOR TIMBER

UNIT	COUNTY	NON-TIMBER ACRES	LANDOWNER TYPE	REASONS FOR EXCLUDING AREA FROM TIMBER ANALYSIS
1	Grays Harbor	191	Private Landowner	Area is zoned as "Resort Residential District" (timber harvest is not permitted per County Zoning Regulations).[1]
2	Whatcom	545	The Lummi Nation	Lands are used for cultural, spiritual, ceremonial, educational, and scientific purposes only. [2]
		523	The Nature Conservancy	Land is in conservation (no timber harvest/road building is allowed). The Nature Conservancy actively supports road abandonment.[3]
3	Pacific	1,151	US Bureau of Land Management	Timber harvest is prohibited in Cape Disappointment State Park.[4]
		359	WA Parks and Recreation Commission	
5	Clatsop Tillamook	1,063	OR Dept. of Parks and Recreation (H.B. Van Duzer Forest State Scenic Corridor)	This natural area buffers a 10 mile corridor on either side of State Highway 8. No timber harvest is allowed in this "pristine, self-controlled ecosystem". "Social trails" exist, however, the only trail proposed by the Dept. will only allow brush clearing during its construction.[5]
11	Del Norte	651	Private Landowner	Responsible parties of the M/V Stuyvesant/Humboldt Oil Spill in September of 1999 purchased conservation easement of the "Miracle Mile' property from Green Diamond. Timber harvest is prohibited and area is actively managed for promotion of marbled murrelet habitat by Save the Redwoods League.[6]
12	Humboldt	923	CA Dept. of Fish and Game	Owl Creek Ecological Reserve. No management plan in place currently and no anticipated activities or management in the near future. No Timber Harvesting.[7]
		39,954	CA Dept. of Parks and Recreation	Commercial Timber Harvesting is not allowed on CA Parks and Rec Lands. Thinning may occur, but it is not performed in old growth areas and is not performed in the any of the areas designated for proposed critical Habitat.[8]
		167	County Lands	Van Duzen Park. No Timber Harvesting; primarily recreational.[9]
13	Mendocino	5,256	CA Dept. of Forestry and Fire Protection	There are 5475 total acres within pCH. The CA Dept. of Forestry and Fire Protection estimates they might harvest approximately 2~4% percent of lands within the boundaries or pCH (219 acres). Jackson Demonstration State Forest. Timber Harvesting has occurred in the past, and may occur on 2 - 4% of the proposed designation, if not less, in the future. The current management plan drafts designated Late Seral areas for conservation.[10]
		2,709	CA Dept. of Parks and Recreation	Commercial Timber Harvesting is not allowed on CA Parks and Rec Lands. Thinning may occur, but it is not performed in old growth areas and is not performed in the any of the areas designated for proposed critical Habitat.[11]

UNIT	COUNTY	NON-TIMBER ACRES	LANDOWNER TYPE	REASONS FOR EXCLUDING AREA FROM TIMBER ANALYSIS
14	Santa Cruz	26,373	CA Dept. of Parks and Recreation	Commercial Timber Harvesting is not allowed on CA Parks and Rec Lands. Thinning may occur, but it is not performed in old growth areas and is not performed in the any of the areas designated for proposed critical Habitat.[12]
	San Mateo	7,246		
		978	City Lands	This area is under a Scenic Easement, development and land use are designed to ensure watershed protection. Although there is fire management and removal of invasive species there is no timber harvesting.[13]
		7,990	County Lands	Some thinning could occur in Pescadero County Park, but it is still being debated and unlikely to occur. No Timber Harvesting in any other county park.[14]
		2,465	Regional Open Space District[16]	No timber harvesting or thinning on Purisima Creek Open Space land; open space is designated for low-impact recreational activity.[15]
Totals:		**97,893**		

Notes:

[1] Grays Harbor Zoning Codes. Accessed from internet on January 15, 2007 from http://www.co.grays-harbor.wa.us/info/pub_svcs/GHCCode/pdf/GHC17.pdf

[2] Personal Communication with Jim Hanson, Lummi Natural Resources Director of Restoration; 2/19/07

[3] Written communication with Fayette Krause; WA Lands Steward, The Nature Conservancy, 2/1/07.

[4] Cape Disappointment State Park Master Plan. Final Environmental Impact Statement. PP. 2; 39-48. February 2004.

[5] Personal communication with Claude Croker, District Manager for State Parks and Recreation Department; 2/21/07

[6] "Humboldt Coast Oil Spill Settled "Mircale Mile" of Marbled Murrelet habitat Protected", News Release July 25, 2006. Al Donner, US Fish & Wildlife Service; Dana Michaels, CA Dept. of Fish & Game; http://www.fws.gov/sacramento/ea/Documents/StuyvesantSettleNR--final.pdf

[7] Written Communication from Karen Kovacs, Wildlife Biologist, CA Dept. of Fish and Game, 1/17/07

[8] Written Communication with Portia Halbert, CA Dept. of Parks and Recreation, 2/1/07. Personal Communication with Dave Schaub, CA Parks and Recreation, 3/5/07

[9] Personal Communication with Bob Walsh, Humboldt County Parks Superintendent. 2/27/07

[10] Written Communication with Marc Jameson, CA Dept. of Forestry and Fire Protection, Jackson Demonstration State Forest Manager, 2/1/07

[11] Written Communication with Portia Halbert, CA Dept. of Parks and Recreation, 2/1/07. Personal Communication with Dave Schaub, CA Parks and Recreation, 3/5/07

[12] Written Communication with Portia Halbert, CA Dept. of Parks and Recreation, 2/1/07. Personal Communication with Dave Schaub, CA Parks and Recreation, 3/5/07

[13] Written Communication with Tim Ramirez, Manager of Land and Natural Resources Division, Water Enterprise, San Francisco Public Utilities Commission. 2/5/07

[14] Written communication with Matt Del Carlo, Ranger III, San Mateo Parks and Recreation Commission, 1/31/07; personal communication on 3/5/07

[15] Written Communication with Kirk Lennington, Planning Division, Mid-Peninsula Open Space District, 2/5/07. Personal Communication with Kirk Lennington: 3/5/07

[16] Lands identified as being managed by the Regional Open Space District were formally incorrectly identified as CA Dept. of Parks and Recreation lands.

EXHIBIT 4-9 TIMBER LAND APPRAISAL ON PRIVATE LANDS

Atterbury Consultants, Incorporated was retained to appraise the timberland values across all private timberlands (approximately 41,000 acres) within the areas proposed for final critical habitat.[1] Industrial Economics, Incorporated provided Atterbury Consultations, Incorporated with a GIS shape file delineating the area of concern for the timberland appraisal.

Forest Inventory Determination

The timberland polygon classifications are based on tree species, age and stocking characteristics. The polygons were photo interpreted from 2005 and 2006 NAIP (National Agriculture Imagery Program) 1 meter resolution color imagery. These GIS acres were loaded into Atterbury Consultants' Forestland Inventory Planning System (FLIPS) program along with the timber polygon species, age, site index and stocking level values which were interpreted from the NAIP imagery. Once the timber type values were loaded into FLIPS, the volume per acre by species and timber type was calculated from local yield tables which were then utilized in the timberland appraisal process.

Additionally, a slope analysis was performed using USGS 30-meter resolution digital elevation models (DEM's). The project area was classified as either being less than or equal to 30 percent slope, or greater than 30 percent slope. This is generally where there is an operational cost differential between ground-based (tractor) yarding and cable yarding (where the slope is too steep for ground-based logging, a tall pole is erected along a ridgetop, and is then used to pull logs with steel cables to a landing).

Inventory Valuation Method

The forest inventory data summarized by five-year age classes and reported by county was input into Atterbury Consultants' Sum-of-the-Parts (SOP) valuation model along with predicted future harvest volumes, based on the inventory and site index data.

Regional log prices and logging cost data were input by county and species. The analysis assumed a real price increase of 0.3 percent for future log prices, consistent with the current long-term view of future log prices. Log Line log price reporting service (February, 2007) was the source of "delivered" log prices used in the SOP model for counties located in Washington and Oregon. In California, the California State Board of Equalization Harvest Value Schedule was used to provide regional stumpage prices, which we used in the model. Since the prices do not include the costs of getting the logs to the mill, we do not include these costs in the cost side. We do however include a management cost for California timberland operations in the SOP model of $132 per mbf. The age classes were then given a number of years until harvest, to provide a discounting to present value.

The total value of the timber is then calculated by multiplying the operational timberland acres by the volume per acre by the species percent by the species log price. This value is then discounted back to the present by the number of years it will take to reach harvest age.[2]

The timber *land* value is also calculated, using Land Expectation Value (LEV). This is an estimate of the value of a tract of land for growing timber. It is the present net value of all revenues and costs forever associated with growing timber on the land (not just those associated with one rotation or other time period). LEV can be interpreted as the maximum price you can pay for a tract of timber, if you expect to earn a rate of return greater than or equal to the discount rate used to calculate LEV.

The non-productive land acres are then given an average value of $200 per acre. This is a regional average value currently applied to the combination of acres that make up non-productive land within most timberland tracts (roads and streams or other bodies of water and riparian areas around streams).

The values are added together to provide a total present Sum-of-the-Parts timber value for each county as presented in Exhibit 4-11.

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[1] Toby Atterbury of Atterbury Consultants has over 40 years of appraisal experience in the Washington, Oregon, and Northern California area. Since 2000, the firm has appraised over 4 million acres in the Pacific Northwest.

[2] Atterbury Consultants used a 6.5 percent discount rate, an average competitive rate generally being employed for timberland acquisition appraisals in the western U.S. at present. Industrial Economics, Incorporated re-ran the SOP model using zero, three, and seven percent discount rates consistent with guidance from the Department of the Interior regarding this analysis.

4.3 PRE-DESIGNATION IMPACTS

83. Pre-designation impacts on timber activities have occurred in Units 3, 4, 6, 13, and 14 as a result of species surveying and monitoring to prohibition of timber harvest and HCP planning. These efforts and associated impacts are summarized in Exhibit 4-10.

EXHIBIT 4-10 PRE-DESIGNATION IMPACTS

UNIT	LANDOWNER TYPE	STATE	CONSERVATION EFFORT	PREDESIGNATION IMPACTS (1992 - 2006)		
				UNDISCOUNTED IMPACT	PRESENT VALUE (3%)	PRESENT VALUE (7%)
2	Private Landowner	WA	Survey and Monitoring	$26,000	$31,300	$29,400
3	County Lands	WA	Surveying and Monitoring	$78,500	$82,700	$88,600
4	Various Oregon State Agencies	OR	Surveying and Monitoring; Seasonal Restrictions; Prohibition of Timber Harvest	$11,400,000	$14,400,000	$20,000,000
6	Various Oregon State Agencies	OR	Surveying and Monitoring; Seasonal Restrictions; Prohibition of Timber Harvest	$398,000	$494,000	$413,000
14	Private Landowner	CA	Surveying and Monitoring; Prohibition of Timber Harvest; HCP development	$912,000	$1,201,000	$931,000
			Total:	**$12,800,000**	**$16,200,000**	**$21,400,000**

Sources:

Unit 3: Past expenditures on conservation efforts obtained from Larry Smith, Director of Grays Harbor County Dept. of Forestry, March 9, 2007.

Unit 4: Astoria District Implementation Plan, Oregon Department of Forestry, March 2003. Pg. 23; Tillamook District Implementation Plan, Oregon Department of Forestry, March 2003. Pg. 25.; Written communication with Barbara Lee, State Forests Policy and Planning Manager, Oregon Department of Forestry, March 9, 2007.

Unit 6: West Oregon District Implementation Plan, Oregon Department of Forestry, March 2003. Pg. 26.; Written communication with Barbara Lee, State Forests Policy and Planning Manager, Oregon Department of Forestry, March 9, 2007.

Unit 14: Written communication from Janet Webb, Chief Forester and Part-owner, Big Creek Lumber Co., March 2, 2007.

4.4 POST-DESIGNATION IMPACTS

84. As described in Section 4.2, post-designation impacts of murrelet conservation are forecast according to two scenarios. Scenario 1 quantifies ongoing and currently planned conservation efforts, while Scenario two quantifies the upper bound impact that would occur if the entire area proposed for final critical habitat discontinued timber harvest for the benefit of the murrelet.

85. Exhibit 4-11 presents a summary of the timberland appraisal results by county. These per acre land value losses were applied across the private timberlands proposed for final critical habitat to estimate land value losses under Scenario 2.

86. Exhibit 4-1, at the beginning of this Section presents a summary of post-designation impacts according to the two scenarios outlined in Section 4.2.2. Total impacts to timber activities under Scenario 1 are estimated to be approximately $20.8 million (assuming a seven percent discount rate), about 12 percent of the impacts forecast under Scenario 2.

87. More than 50 percent of the total timber impacts (regardless of the scenario assumed) occur within Unit 4, assuming a seven percent discount rate (49 percent of present value high-end impacts assuming a three percent discount rate). Unit 4 is the largest unit proposed for final critical habitat, accounting for roughly 56 percent of all of the active timberlands. Another 30 percent of the high-end forecast impact occurs in Unit 3 (assuming either a three or seven percent discount rate). Accordingly, more than 80 percent of the timber impacts are associated with murrelet conservation in these two units.

EXHIBIT 4-11 IMPACTS TO PRIVATE TIMBERLAND ACRES*

COUNTY	TIMBER ACRES	TOTAL TIMBER VOLUME PRODUCED (MBF)	AVERAGE MBF/ACRE	TOTAL VALUE** TIMBERLAND (UNDISCOUNTED)	AVERAGE $/ACRE (UNDISCOUNTED)	TOTAL VALUE** TIMBERLAND (3%)	AVERAGE $/ACRE (3%)	TOTAL VALUE** TIMBERLAND (7%)	AVERAGE $/ACRE (7%)
Grays Harbor, WA	7,190	47,586	8.2	$110,464,473	$15,364	$45,654,807	$6,350	$18,027,872	$2,507
Lewis, WA	880	7,059	8.0	$11,286,825	$12,826	$ 4,478,543	$5,089	$1,685,959	$1,916
Pacific, WA	12,996	100,783	7.8	$220,210,423	$16,944	$88,283073	$6,793	$33,942,948	$2,612
Skagit, WA	1,225	8,122	6.6	$16,428,087	$13,411	$6,814,224	$5,563	$2,742,137	$2,237
Wahkiakum, WA	1,711	8,112	4.7	$28,777,264	$16,819	$12,327,200	$7,205	$5,275,076	$3,083
Tillamook, OR	374	3,004	8.0	$4,478,785	$11,975	$1,904,546	$5,092	$796,191	$2,129
Mendocino, CA	1,262	11,948	11.5	$18,518,870	$14,674	$5,045,986	$3,998	$1,038,582	$823
San Mateo, CA	11,318	199,907	17.7	$165,089,426	$14,586	$38,073,096	$3,364	$5,905,726	$522
Santa Cruz, CA	4,875	64,179	13.2	$45,711,050	$9,377	$13,704,911	$2,811	$4,172,747	$856
Total	41,831	450,700	10.8	$620,965,203	$14,845	$216,286,386	$5,170	$73,587,238	$1,759

Source: Atterbury Consultants, Incorporated memorandum to Industrial Economics, Incorporated, Timberland Valuation of Potential Marbled Murrelet Habitat, dated February 13, 2007 (received March 13, 2007).

* Impacts to public timberlands owned by Grays Harbor County and the California Department of Forestry and Fire Protection (1,565 and 219 acres respectively) are also based on the estimates in this exhibit.

** Methods and data sources are described in Exhibit 4-9.

EXHIBIT 4-12 IMPACTS TO PUBLIC (OREGON DEPARTMENT OF FORESTRY) TIMBERLAND ACRES)

DISTRICT	VIABLE ACRES FOR TIMBER HARVEST*	PERCENT OF DISTRICT PROPOSED FOR FINAL CRITICAL HABITAT	ANNUAL HARVEST OVER ENTIRE DISTRICT (ACRES)	VALUE PER ACRE	TOTAL VALUE TIMBERLAND (UNDISCOUNTED)	AVERAGE $/ACRE (UNDISCOUNTED)	TOTAL VALUE TIMBERLAND (3%)	AVERAGE $/ACRE (3%)	TOTAL VALUE TIMBERLAND (7%)	AVERAGE $/ACRE (7%)
Astoria	23,958	17.62%	750	$19,250**	$254,333,548	$10,616	$84,777,849	$3,539	$36,333,364	$1,517
Tillamook	31,866	12.81%	4,850	$6,537†	$406,077,364	$12,743	$135,359,121	$4,248	$58,011,052	$1,820
West Oregon	10,196	27.14%	90	$8,588†	$20,978,268	$2,057	$6,992,756	$686	$2,996,895	$294

Source: Astoria District Implementation Plan, Oregon Department of Forestry, March 2003. Pg. 23; Tillamook District Implementation Plan, Oregon Department of Forestry, March 2003. Pg. 25.; West Oregon District Implementation Plan, Oregon Department of Forestry, March 2003. Pg. 26.

* These acres do not include those acres unviable for timber harvest due to deed restrictions clearly precluding the harvest of timber for commercial purposes inoperable areas as determined for the H&H model (these areas are not suited to existing logging systems) and inner zone Riparian Management Areas that receive little, if any management. Written communication from Barbara Lee, State Forests Policy and Planning Manager, Oregon Department of Forestry, March 9, 2007,

** The Astoria District was able to provide current value information for the Clatsop State Forests, which is "an estimated value of $19,250/acre. This is based on 55MBF/AC of a nearly equal Doug-fir/Hemlock mix at an estimated stumpage value of $350/acre. Written communication with Barbara Lee, State Forests Policy and Planning Manager, Oregon Department of Forestry, March 9, 2007.

† Per-acre values were derived from the OR DOF 2001 Northwest Forest Management Plan (Tables 5-1 and 5-2. Chapter 5, page 5-10, "Summary of Anticipated Outcomes from Implementing the Asset Management Guidelines"). Provided by Barbara Lee, State Forests Policy and Planning Manager, Oregon Department of Forestry, March 9, 2007.

4.5 ASSUMPTIONS AND CAVEATS

88. The major assumptions underlying the analysis of impacts to timber activities are summarized in Exhibit 4-13. As described in Section 4.2.3, the difference in valuing lands owned by the Oregon Department of Forestry and all other timberlands constitutes a major caveat in the timber analysis. Inventory data provided by the Oregon Department of Forestry is approximately ten years old and the stumpage values data used to calculate per-acre values was provided by the Department.[42] The Atterbury Consultants Incorporated developed timber inventory and age class data based on aerial photography.[43] That is, neither party appraised land site-specific timber land values with site visits for the purposes of this report. This analysis presents impacts as undiscounted and discounted at three and seven percent. As stated above, timberland appraisers in the Pacific Northwest indicate that six percent is a more accurate discount rate generally applied to timberland appraisals in the region.

89. Industrial Economics received information from various private timber owners regarding timber values. In order to value all timberlands in like terms with a single method, the land values are based on the information from timberland appraisal experts, Atterbury Consultants. Information provided by timber landowners was, however, used to ground-truth the inventory and yield data employed in the analysis. Some estimates provided by private timber companies suggested higher per-acre timber values than that estimated by Atterbury Consultants.

90. Specifically, Industrial Economics received data on timberland inventory and timber stumpage values from the following private timberland owners and managers:[44]

- The Oregon Department of Forestry;
- The Campbell Group (land managers for the Hawthorne Timber Company and Pacific West Timber Company);
- Big Creek Lumber Company;
- Grays Harbor County;
- Mid-Valley Resources;
- Green Diamond Resource Company; and
- California Department of Forestry and Fire Protection.[45]

[42] Written communication with Barbara Lee, State Forests Policy and Planning Manager, Oregon Department of Forestry, March 13, 2007.

[43] Unimpeachable verification timber values in all instances, particularly with how they related to engineering and market-driven factors, would require a prohibitive expenditure of time and resources given the scope and time constraints of the this analysis.

[44] Industrial Economics additionally contacted Weyerhaeuser (who owns nearly 10,000 acres in Units 2 and 3) and International Forestry Consultants (managers of over 1,000 acres owned by Western Asset Management Company in Unit 1) regarding their forest inventory but did not receive additional data related to their timber holdings in the area proposed for final critical habitat.

EXHIBIT 4-13 SUMMARY OF CAVEATS TO TIMBER ANALYSIS

ASSUMPTION	POTENTIAL EFFECT ON RESULTS
Under Scenario 2, this analysis assumes all timber harvest is precluded due to total occupancy of the area by the murrelet.	+
Lands currently zoned for timber are assumed to continue to be managed for timber in the foreseeable future unless otherwise indicated.	+/-
Information related to timber inventory and age class used the analysis is estimated from recent aerial photography and inventory data; these estimates were not corroborated with site-specific visits.	+/-
Some private timber owners provided data suggesting higher timber yields than estimated in the values performed by the regional timberland appraisal experts (Atterbury Consultants).	-
+: This assumption may result in an overestimate of real costs. - : This assumption may result in an underestimate of real costs. +/-: This assumption has an unknown effect on estimates.	

[45] Information provided by the listed companies, in some cases, contrasted estimates employed in the timber appraisal performed by Atterbury Consultants, Incorporated. Specifically, timber volumes provided by Big Creek Lumber Company were, in some areas, more than twice as great as those estimated by Atterbury Consultants, Incorporated. Grays Harbor County reported timber volumes that were over four times larger than estimates estimated by Atterbury Consultants, Incorporated. Consequently, the per-acre values for these lands may be higher than reported in the analysis.

SECTION 5 | DEVELOPMENT

91. The Proposed Rule specifies land conversion to a non-forested condition as a potential threat to the murrelet.[40] Because development activities may fit this description, this section describes potential impacts of murrelet conservation on the value of future residential, commercial, and industrial development in the areas proposed for final critical habitat. Development may affect the species or its habitat by restricting movement via habitat fragmentation, or direct habitat loss through the removal of trees. Owners of parcels containing murrelet or designated critical habitat may face land use restrictions that preclude development on some or all of the parcel, thereby reducing the value of the property.

92. In general, future development is unlikely in a majority of the area proposed for final critical habitat. The area is more that 85 percent public lands managed for timber and recreation, and not forecast to be subject to future development. This analysis identifies areas that may be subject to development in the future by examining current zoning, and consulting with county planning departments. Accordingly, three units contain areas that are currently zoned to allow the possibility of future development: Unit 1 (1,775 acres), Unit 3 (5,636 acres), and Unit 14 (5,680 acres).

93. Similar to the timber analysis, in order to capture the uncertainty associated with how future development activities may be managed for the benefit of the murrelet, this analysis applies two scenarios to forecast impacts: a) Scenario 1 is a low bound scenario for which no economic impact is forecast; and b) Scenario 2 is a high bound scenario and assumes all future development is precluded in the areas proposed for final critical habitat. These scenarios are discussed in Section 5.2.

5.1 SUMMARY OF RESULTS

94. Scenario 1 impacts are forecast to be zero. According to Scenario 2, the lost option value for future new development in areas proposed for final critical habitat is estimated to be $59.8 million. Approximately 81 percent of this lost land value is associated with precluding development in Unit 14, Santa Cruz Mountains; this region has the greatest estimated per acre value for development within the study area. Post designation impacts to development are presented by subunit in Exhibit 5-1.

[40] U.S. Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Marbled Murrelet; Proposed Rule, 71 FR 176, September 12, 2006.

EXHIBIT 5-1 ESTIMATED SCENARIO 2 DEVELOPMENT IMPACTS BY SUBUNIT

UNIT/ LANDOWNER TYPE	ESTIMATED FOREGONE DEVELOPMENT (ACRES)	TOTAL VALUE OF FOREGONE DEVELOPMENT ($2007)	AVERAGE VALUE PER ACRE ($2007)
Unit 1: Private Landowners	1,775	$2,140,000	$1,200
Unit 3: Private Landowners	5,636	$8,930,000	$1,580
Unit 14: Private Landowners	5,680	$48,700,000	$8,580
TOTAL	**13,091**	**$59,800,000**	**$4,570**
Note: Totals may not sum due to rounding.			

5.2 METHODS AND ASSUMPTIONS

95. According to the Service, the same conservation efforts apply to development activities as to timber harvest activities; that is, if a stand is found to be occupied by the murrelet, removal of trees may be precluded.[41] Similar to the timber analysis, absent information on which stands may be occupied across the developable areas proposed for final critical habitat, this analysis quantifies the potential economic impacts to development activities according to two scenarios. These scenarios are employed to capture the uncertainty associated with how future development activities may be managed for the benefit of the murrelet.

- **Scenario 1** is a low bound scenario and economic impacts are forecast to be zero, or negligible. This low bound estimate of no impact assumes that residential development is feasible at low densities and that it does not entail the removal of occupied stands in proposed critical habitat. The actual threat listed in the Proposed Rule and Recovery Plan for the murrelet is "land conversion practices" in which land is converted to a non-forested state. It may be feasible for development to occur without the cutting of trees, therefore minimizing threat to the murrelet. Scenario 1 hinges on the assumption that sparse, low-density residential development may occur and will not need to be modified for the benefit of murrelet conservation.
- **Scenario 2** is a high bound scenario and assumes all future development is precluded in the areas proposed for final critical habitat. This high bound impact may occur in the case that no development proceeds on the acres zoned for future development in the areas proposed for final critical habitat. There is precedence for this assumption: in the past consultations the Service has recommended

[41] Written communication from the U.S. Fish and Wildlife Service, Western Washington Fish and Wildlife Office on December 8, 2006, and the Oregon Fish and Wildlife Office on December 11, 2006.

prohibiting the conversion of property to a non-forested condition, or to agricultural, commercial, or industrial uses.[42] To capture this impact, this analysis quantifies reductions in land value associated with the lost option for future development.

96. For Scenario 2, this analysis applies two major steps to quantify impacts of murrelet conservation on development activities. The analytic steps are detailed in the following sections and summarized in Exhibit 5-2.

1. Approximate the level of potential future development within the areas proposed for final critical habitat; and
2. Quantify lost option values for development.

5.2.1 STEP 1: APPROXIMATE THE LEVEL OF POTENTIAL FUTURE DEVELOPMENT

97. This analysis considers undeveloped land that is zoned for rural, residential, or commercial development; such parcels are considered "developable" in this analysis. Units 1, 3, and 14 contain developable lands. All developable lands are privately owned, primarily by timber companies. All remaining units contain lands zoned only for timber and resource management, recreation, or conservation.

98. Land use practices are varied and diverse across private landholdings in Units 1, 3, and 14. Land uses range from forestry to commercial and residential development. Because of the rural nature of many of the parcels within proposed critical habitat, many private landholdings are zoned for multiple land uses. For example, private landholdings in San Mateo County (Unit 14) are in an unincorporated zoning area and current land uses permit forestry, agriculture, and low-density residential development.[43]

99. Geographic Information Systems (GIS) data and information provided by county assessors and planners are used to ascertain which private lands are undeveloped, which lands are used solely for timber harvesting, and which lands are under conservation easements. Additionally, parcels that have an "improved value," according to existing appraisal data, were removed from the analysis. Improved values denote parcels that have been developed and therefore contain existing infrastructure.[44]

100. This analysis forecasts the development potential of the critical habitat area based on current zoning. It therefore does not account for possible re-zoning within the region to accommodate greater levels of development.

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[42] U.S. Fish and Wildlife Service. "Makah Forest Management Plan 1999-2008 for the Makah Indian Reservation." Formal Consultation # 1-02-1999-F-0534 with the Bureau of Indian Affairs. September 9, 1999.

[43] Personal communication with Joe Camicia, Planner at the San Mateo Planning Department, on March 14, 2007. San Mateo County zoning map accessed at: http://www.co.sanmateo.ca.us/ vgn/images/portal/cit_609/9721954smcuninc.pdf on March 13, 2007.

[44] Because the threat to the murrelet of development is the destruction of habitat through tree removal, existing developments are not assumed to be affected by murrelet conservation in this analysis. Further, because existing development is already a disturbance to murrelet habitat, any redevelopment of developed areas is not expected to affect murrelet habitat conservation efforts.

5.2.2 STEP 2: QUANTIFY LOST OPTION VALUES FOR DEVELOPMENT

101. Impacts to development activities in this analysis are the lost option value for future new development in murrelet habitat. The method applied to estimate this option value depends on the potential future uses of the land as described by its specific zoning code. As described above some parcels are zoned solely for future development, whereas other may be managed for agriculture or timber production.

102. For land parcels for which zoning suggests the only future use is development (silvicultural activities are not ongoing or forecast), this analysis assumes the market value of the parcel reflects its option for future development. That is, the value of the land is a function of its possible future uses. The analysis assumes that the bare land value (the value for land with no potential for future economic use) is negligible.

103. For land parcels zoned for mixed uses, this analysis isolates the fraction of the total market value association with the option for future development by subtracting the value of the parcel for other economic uses, such as timber harvest. The theoretical basis for this method is described in the following text box.

104. This analysis employs the best available data in each geographic region of the study area to quantify the potential economic impacts to development activities. Development option values are calculated on a per acre basis. After identifying parcels that are undeveloped and suitable for future development, an area calculation is performed in GIS to describe the average value per acre. Subsequently, this value is applied to parcels within proposed critical habitat. Section 5.3 describes the data sources and analytic process for the analysis by unit, as the information available varies by unit.

Estimating Development Value

The conceptual framework for estimating the full development value for a parcel of land is based on the theoretical models developed by Capozza and Li (1994) and Capozza and Helsley (1990).[a] Capozza and Helsley's study demonstrates that the price of agricultural land has three components: the value of agricultural rents, the growth premium, and the option value of potential development. This analysis applies this logic to the forested lands within the study area by assuming that the price of land in the study area is comprised similarly of:

- The value of silvicultural rents - This represents the value of land as a silvicultural input and generally reflects the commercial present value of the trees.
- The growth premium - This equals the present value of expected increases in land rents after being converted to development.
- The option value of potential development - This is the value of land derived from the option of future development.

It follows that if development of a parcel of silvicultural land is restricted, it will be worth less than its value in the previously unrestricted state. This reduction in value is a cost to the landowner, with the magnitude of reduction depending on the type of land use restriction imposed. If future development is precluded from a parcel, the reduction in land value equals the sum of growth premium and option value. In some cases, land use information indicates that silviculture is not a possible land use. This may be true, for example, where the tree species mix has negligible commercial value. In such cases, this analysis assumes that the only potential future use of the parcel is for development, and therefore that the full price of the land reflects only its development option and growth premium.

[a] Capozza, D.R. and Yuming Li. "The Intensity and Timing of Investment: The Case of Land." *The American Economic Review*, Vol.84, No. 4 (Sep., 1994):889:904. Capozza, D. R. and R.W. Helsley. "The Stochastic City," *Journal of Urban Economics 28*(1990):187-203.

EXHIBIT 5-2 ZONING AND LAND VALUE OF AREAS FORECAST FOR DEVELOPMENT

UNIT	PRIVATE LANDOWNER	IDENTIFIED ZONING OF DEVELOPABLE ACRES	METHODS AND DATA USED TO CALCULATE THE OPTION VALUE FOR DEVELOPMENT
Unit 1	Western States Asset Management	G5- General Development, Forest Production Zone (90% of County), houses permitted- 5 acre minimum, Commercial/Industrial Uses permitted [a]	County assessor data, zoning, and parcel data were integrated into a GIS interface to ascertain which areas overlap with proposed critical habitat. Land values were obtained by a variety of methods: • **G5 Forestry and RL-** Areas zoned for General Development or Rural Land with a forestry land use designation are appraised for tax purposes and their appraisals do not reflect their market value.[e] The market value of these lands is therefore derived by comparing past sales of similar parcels, information provided by private landowners, and consultation with the county assessor. • **G5 Undeveloped -** Areas within General Development zoning that have an Undeveloped land use designation are appraised at market value. [e] These appraisal data are therefore used to calculate a per acre total value of these lands. • **R3 -** Areas zoned for residential development are appraised at market value. [e]
	Kiroze Inc.		
	Rayonier Timberlands		
	Residential Landowners		
	Residential Landowners	R3- Resort Residential District, Residential Development Allowed- Commercial Use Restricted/Industrial Use Prohibited, 1/8 acre minimum lot sizes) [a]	
Unit 3	Weyerhaeuser	G5- General Development, Forest Production Zone (90% of County), houses permitted- 5 acre minimum, Commercial/Industrial Uses permitted [a]	
	Green Diamond Resource Company		
	Grays Harbor County		
	Private Landowners	RL - Rural Land: Can be used for residential development, silviculture, and agriculture [b]	
Unit 14	Multiple Small Landowners in San Mateo County	Unincorporated zoning - Land uses range from Timberland to Resource Management (an area where forestry, agriculture, and extremely low-density residential development is permitted) [c]	Ownership information in GIS format was consulted to identify and remove from consideration areas that are used for forestry or conservation. [c] The San Mateo County Multiple Listing Service database, personal communication with the San Mateo County Assessor's office, and past lands sales data, were used to estimate the average per acre land value in this region.
	Residential Landowners in Santa Cruz County	Rural residential; Residential ; Unimproved land; Vacant Lots [d]	GIS data were used to identify the location of developable parcels in relation to proposed critical habitat. [d] Past land sale transactions were used to estimate the average per acre market value. This value is ascribed to areas that are undeveloped and suitable for development.

Notes:

[a] Grays Harbor County Code, Chapter 17: Zoning. Available at: http://www.co.grays-harbor.wa.us/info/pub_svcs/GHCCode/pdf/GHC17.pdf Last accessed on March 29, 2007.

[b] Definitions and land use information provided by Marc Scott, Senior GIS Analyst, Pacific County Washington. Personal communication on March 1, 2007.

[c] Personal communication with Joe Camicia, Planner at the San Mateo Planning Department, on March 14, 2007. GIS data purchased from San Mateo County and shipped by Garret Dunwoody, GIS Analyst, San Mateo County.

[d] GIS data downloaded from the Santa Cruz County GIS department: http://gis.co.santa-cruz.ca.us/ Last Accessed on March 29, 2007. Assessor data provided by Michael Herbert, Santa Cruz County Assessor, on February 9, 2007.

[e] Appraised value is an accurate market value for land that is not used exclusively for forestry. Personal communication with Jeanne Laville, Grays Harbor County Chief Assessor, March 22, 2007.

5.3 UNIT BY UNIT RESULTS

5.3.1 UNIT 1: NORTHWEST WASHINGTON

105. Developable lands within Unit 1 are privately owned parcels in Grays Harbor County, Washington. Approximately 1,775 acres of private land are currently undeveloped and zoned to allow for future development. Of these lands, the vast majority (90%) are zoned for General Development, and as such, allow both timber harvesting and residential development. The remaining ten percent is zoned for residential and commercial development only.

106. These private landholdings are rural and remote. Although these lands are suitable for development, the incumbent land use is primarily forestry. To this end, the low per acre development values for many of these parcels reflect the predominance of timber harvesting as opposed to residential development. Zoning and acreage information is presented in Exhibit 5-3; the distribution of these developable lands is highlighted in Exhibit 5-4.

107. The option value for development for lands within Unit 1 is derived using two methods:

- Where land was zoned for residential use, commercial development, or General Development with an "undeveloped" land use designation, a per acre value was derived from the appraised values for each parcel. In this case, the appraised values of the parcels reflect their full market values.[45] As described above, because the economic use of these lands is limited to development, the market value of these areas is assumed to reflect the full option value for development.
- Where land was zoned for General Development and was marked with a "Forestry" land use code, the county assessor was consulted in order to ascertain an accurate market value for the land. Appraised values for forestry land do not reflect the market value of the land. This analysis therefore consulted the development value of similar land for which timber harvest is not a current or future use. This option value for development was then reviewed by the county assessor, who suggested it was a reasonable approximation for the development value of these lands.[46]

[45] Appraised value is an accurate market value for the land that is not used exclusively for forestry. Personal communication with Jeanne Laville, Grays Harbor County Chief Assessor, March 22, 2007.

[46] Sales of large, rural parcels used for timber harvesting are infrequent in Grays Harbor County. Values used for these areas are an estimate of the development value from the chief assessor. Personal communication with Jeanne Laville, Grays Harbor County Chief Assessor, March 22, 2007.

EXHIBIT 5-3 AMOUNT AND VALUE OF DEVELOPABLE LANDS IN UNIT 1

ZONING AND LAND USE	ACRES[a]	OPTION VALUE FOR DEVELOPMENT PER ACRE	TOTAL OPTION VALUE FOR DEVELOPMENT
Residential Development	191	$1,246[b]	$238,000
General Development Lands used for Forestry	1,519	$1,200[c]	$1,820,000
General Development Lands used for development	65	$1,246[b]	$81,000
TOTAL	**1,775**		**$2,140,000**

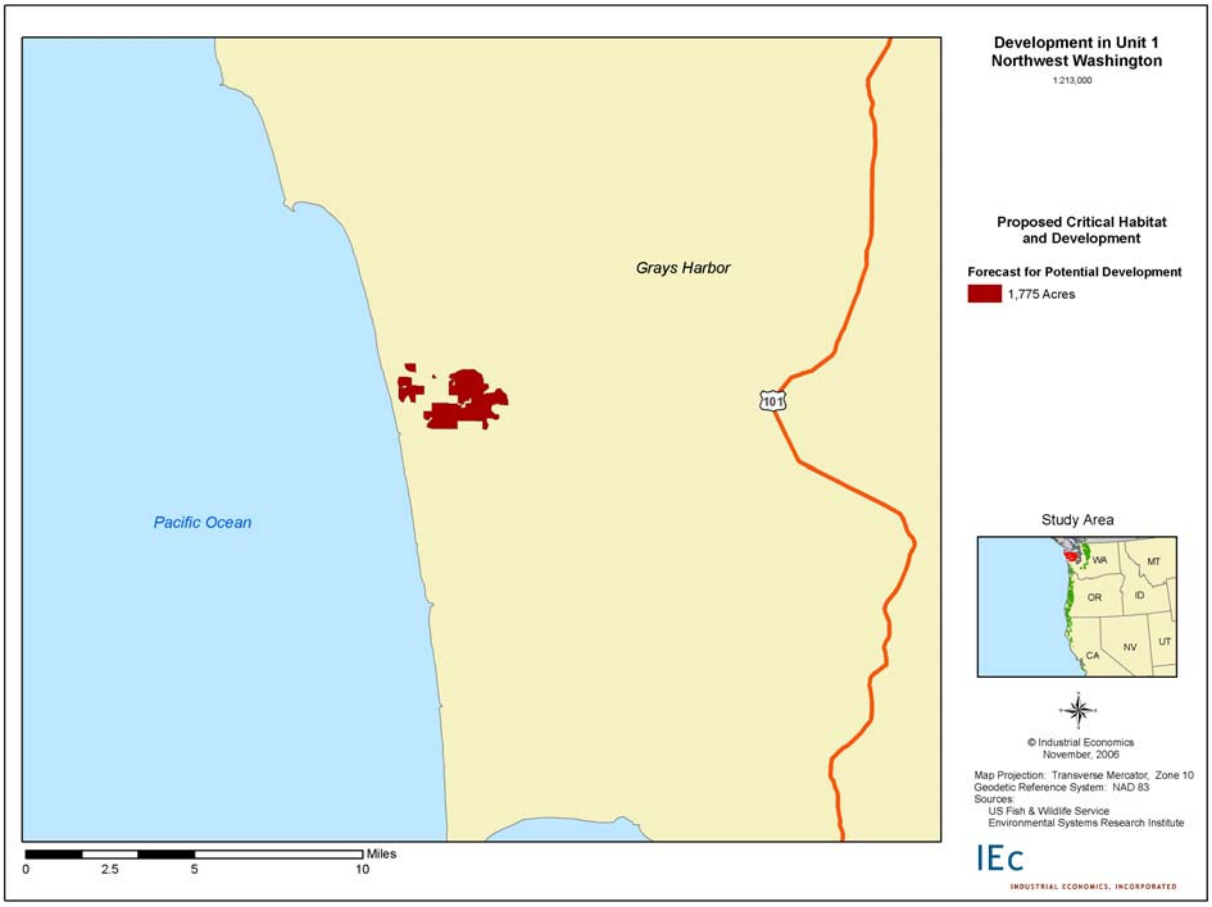
Totals may not sum due to rounding.

[a] Acreages were calculated in a GIS. The GIS combined comprehensive data on zoning, land use, and appraisal information from the Grays Harbor County GIS Department.

[b] Per acre values were calculated using GIS data regarding appraised land values for the county. These lands were zoned for residential development and no other land uses. As such, the appraisal data is an accurate market value (Personal communication with Jeanne Laville, Grays Harbor County Chief Assessor, on March 22, 2007).

[c] For multi-use lands, the silvicultural value of the land is removed from the total market value to estimate the option value for development. Per acre values for forestry land are not easily calculated as sales of these lands are infrequent in the county. The $1,200 is an estimate of development potential provided by Jeanne Laville, Grays Harbor County Chief Assessor, in a personal communication on March 22, 2007. This value coincides with per acre development values in similarly zoned lands in Pacific County, WA (Unit 3), written communication with Angela Stringer, Wildlife Biologist with the Campbell Group, February 27, 2007.

EXHIBIT 5-4 DEVELOPABLE LANDS IN UNIT 1



5.3.2 UNIT 3: SOUTHWESTERN WASHINGTON

108. Developable land in Unit 3 is limited to 5,636 acres of privately owned land in Pacific County and Grays Harbor County, Washington. Similar to land use and land values in Unit 1, per acre development values in Unit 3 reflect the predominance of forestry on rural parcels zoned for General Development. Although some areas are zoned specifically for residential development, the majority of private landholdings in this unit are used for forestry.

109. With the exception of 30 acres of land zoned for rural land uses in Pacific County (residential development, forestry, and agriculture), all land in Unit 3 is zoned for General Development and is in Grays Harbor County. Within the General Development zoning classification, 3,992 acres have a "Forestry" land use designation. There are 1,614 acres

of land that are zoned for General Development with an "Undeveloped" land use designation. Zoning and acreage information is presented in Exhibit 5-5; the distribution of these developable lands is highlighted in Exhibit 5-6.

110. The option value for development is derived using three methods:

- For land zoned for General Development with an "Undeveloped" land use designation a per acre value was derived from the appraised values for each parcel. In this case, the land values as appraised reflect the market values of the parcels.[47] As described above, because development is the only forecast land use, the market value of these areas is assumed to reflect the full option value for development.
- Where land was zoned for General Development and was marked with a "Forestry" land use code, the county assessor was consulted in order to ascertain an accurate market value for the land. Appraised values for forestry land are conducted for tax purposes do not reflect the market value of the land. This analysis therefore consulted the development value of similar land for which timber harvest is not a current or future use. This option value for development was then reviewed by the county assessor, who suggested it was a reasonable approximation for the development value of these lands.[48]
- For the 30 acres of Rural Lands in Pacific County, a per acre value was derived from the market values of land and timber in the area. Information was provided on the total market value of the parcels ($16,025 per acre)and the fraction of market value associated with the silvicultural use of the land ($14,525 per acre).[49] The difference between these values is assumed to reflect the option value for potential future development of the land ($1,500 per acre).[50]

[47] Appraised value is an accurate market value for the land that is not used exclusively for forestry. Personal communication with Jeanne Laville, Grays Harbor County Chief Assessor, on March 22, 2007.

[48] Sales of large, rural parcels used for timber harvesting are infrequent in Grays Harbor County. Values used for these areas are an estimate of the development value from the chief assessor. Personal communication with Jeanne Laville, Grays Harbor County Chief Assessor, March 22, 2007.

[49] For values in Pacific County. Angela Stringer provided a development value of $1,500 per acre for lands that are primarily used for forestry. Written communication with Angela Stringer, Wildlife Biologist at the Campbell Group, February 27, 2007.

[50] Jeanne Laville, Chief Assessor in Grays Harbor County, confirmed this value as an accurate estimate of the development value for large, rural parcels primarily used for forestry. Personal communication with Jeanne Laville, March 22, 2007.

EXHIBIT 5-5 AMOUNT AND VALUE OF DEVELOPABLE LANDS IN UNIT 3

ZONING AND LAND USE	ACRES[a]	OPTION VALUE FOR DEVELOPMENT PER ACRE	TOTAL OPTION VALUE FOR DEVELOPMENT
Rural Lands (Pacific County)	30	$1,500[b]	$45,000
General Development Lands used for Forestry	3,992	$1,200[c]	$4,790,000
General Development Lands used for development	49	$6,781[d]	$332,000
General Development Lands that are undeveloped (owned by Grays Harbor County)	1,565	$2,402[d]	$3,760,000
TOTAL	**5,636**		**$8,930,000**

Totals may not sum due to rounding

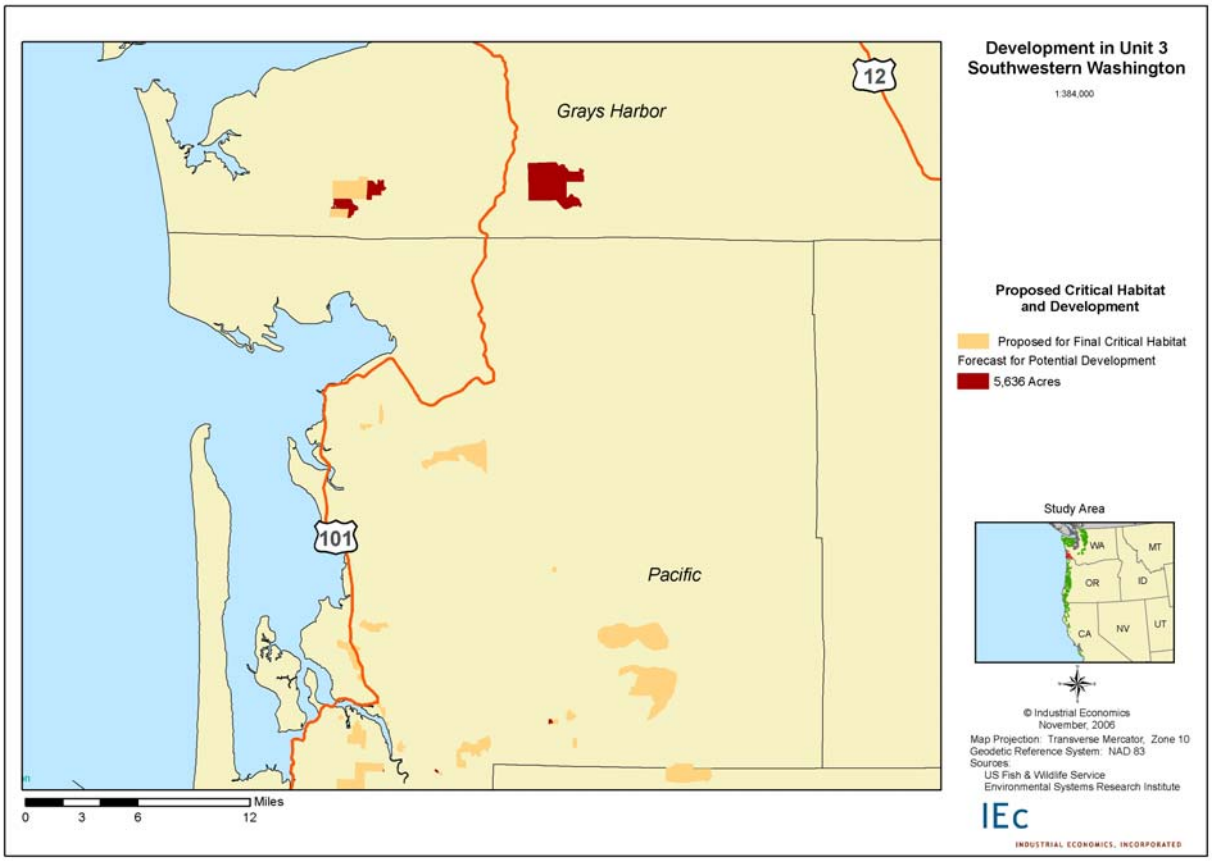
[a] Acreage information calculated in GIS using zoning, land use, and appraisal information. GIS data provided by the Pacific County GIS Department and Grays Harbor GIS Department.

[b] Angela Stringer provided a development value of $1,500 per acre for lands in Pacific County. Written communication with Angela Stringer, Wildlife Biologist at the Campbell Group, February 27, 2007.

[c] Development value for forestry lands provided by Jeanne Laville, Grays Harbor County Chief Assessor, in a personal communication on March 22, 2007.

[d] These values are from GIS appraisal data. Appraisal data is an accurate market value for areas zoned for residential development. Personal communication with Jeanne Laville, Grays Harbor County Chief Assessor, on March 22, 2007.

EXHIBIT 5-6 DEVELOPABLE LANDS IN UNIT 3



5.3.3 UNIT 14: SANTA CRUZ MOUNTAINS

111. There are 5,680 acres of developable land in Unit 14. 4,278 acres are in San Mateo County and 1, 402 acres are in Santa Cruz County. This land is mostly composed of large, undeveloped rural parcels that straddle the San Mateo and Santa Cruz County border. A GIS analysis of Unit 14 confirms the fundamentally rural nature of the area--the average parcel size in this analysis ranges from 12 acres in Santa Cruz County to 17 acres in San Mateo County.

112. In Unit 14, comprehensive zoning and land use information is not uniformly available. This analysis therefore applies GIS parcel data to identify which private land is not active timber land. Using inputs from the San Mateo County and Santa Cruz County Assessor's office--as well as GIS data on ownership, land use, and conservation easements-- parcels that are not considered developable are removed from the analysis.

113. Land in San Mateo County is in an unincorporated zone, and land use is primarily designated as Resource Management. This land use designation limits dense residential development and permits forestry and agricultural land uses.[51] Detailed GIS data exists for Santa Cruz County, and as such, areas identified in this analysis have land use designations that are specific and include rural residential or commercial development.

114. Because the zoning data for the unincorporated portion of San Mateo is very general, this analysis consults a regional development projection model in order to characterize the relative level of development pressure that the region may experience. The California Urban and Biodiversity Analysis (CURBA) model uses GIS technology to provide spatial predictions of the extent of urban growth through the year 2030. The basis of the CURBA model is a set of econometrically estimated development probabilities that incorporate the preferences of consumers for distance and landscape features in their choice of location. By overlaying the proposed critical habitat unit areas over CURBA predictions, it is possible to measure the expected amount of development that is likely to take place within critical habitat.

115. The CURBA model forecasts development in terms of projected new housing by census tract. For the five census tracts that overlap developable areas in Unit 14, CURBA predicts approximately 543 houses may be built by 2030. Information is not available to determine the acreage upon which these housing units may be constructed; this analysis therefore does not make any assumptions regarding the size and distribution of the forecast housing units across the 5,680 acres identified as developable in Unit 14. Instead, this analysis employs the CURBA results as evidence of some development pressure within this region, and estimates land value losses across the entire 5,680 developable acres proposed for final critical habitat.

116. Appraised land values of the developable areas do not fully capture the market value of land.[52] The per acre estimate of the option value for future development is therefore derived from past sales of parcels with similar amenities and land uses.

117. The market values for undeveloped land in San Mateo and Santa Cruz County are not easily quantified and aggregated. Issues of topography, view, proximity to roads, and septic suitability make each parcel unique and difficult to generalize.[53] The variable geography of Unit 14 parallels the multi-parcel sale history in the Santa Cruz Mountains. Oftentimes small, undesirable parcels that cannot be developed are included as a "multi-parcel sale" that includes larger and more valuable parcels.[54] Multi-parcel sale data obfuscates the current state of development of any given parcel and inhibits an accurate

[51] Personal communication with Joe Camicia, Planner at the San Mateo Planning Department, on March 14, 2007.

[52] Personal communication with Santa Cruz Chief Assessor Sean Saldavia, on March 14, 2007.

[53] Personal communication with Santa Cruz Chief Assessor Sean Saldavia, on March 14, 2007. Written and personal communication with Debbie Donner, Santa Cruz County real estate agent, on March 15, 2007.

[54] From GIS and database analysis of 2005 -2006 sale data provided by Michael Herbert, Santa Cruz Assessor.

GIS analysis of the area. To this end, sale data from 2003 and 2004 from the San Mateo Multiple Listing Service database of undeveloped, rural parcels was analyzed.[55] Additionally, a report by Economics Research Associates for the Mid-Peninsula Regional Open Space District analyzes sale data of large, undeveloped parcels in the Santa Cruz Mountains.[56]

118. In Santa Cruz County, a per acre option value of development of $11,105 is ascribed to all 1,402 acres. This value is the full market value of the land, which is assumed to reflect its option for development as no other land use is currently allowed according to existing zoning. In San Mateo County a per acre value of $7,756 is ascribed to all 4,278 acres. Because these lands are designated primarily for Resource Management (silviculture), the timber value of these lands is taken into consideration and removed from the market value of the parcel. The average market value per acre is $11,105 according to recent land sales.[57] The timber value of these lands is appraised at $3,349 per acre in San Mateo County by Atterbury Consultants as described in Section 3 of this analysis. The difference in these values, $7,756 per acre, is assumed to reflect the average per acre value of the option for future development.

[55] San Mateo County Multiple Listing Service database. Past sale information provided by Bob Cerelli, Assessor at the San Mateo County Assessor's Office. Personal communication on March 14, 2007.

[56] Economics Research Associates, "Fiscal Impact Analysis of the Proposed Annexation of the San Mateo County Coastside by the Midpeninsula Regional Open Space District." June 2003.

[57] San Mateo County Multiple Listing Service database. Past sale information provided by Bob Cerelli, Assessor at the San Mateo County Assessor's Office. Personal communication on March 14, 2007.

EXHIBIT 5-7 AMOUNT AND VALUE OF DEVELOPABLE LANDS IN UNIT 14

ZONING AND LAND USE	ACRES[a]	OPTION VALUE FOR DEVELOPMENT PER ACRE	TOTAL OPTION VALUE FOR DEVELOPMENT
Unincorporated (Resource Management, Timber Production, Residential, Agricultural)	4,278a	$7, 756[c]	$33,200,000
Rural Residential, vacant, undeveloped	1,402b	$11,105 [d]	$15,600,000
TOTAL	**5,680**		**$48,700,000**

Totals may not sum due to rounding.

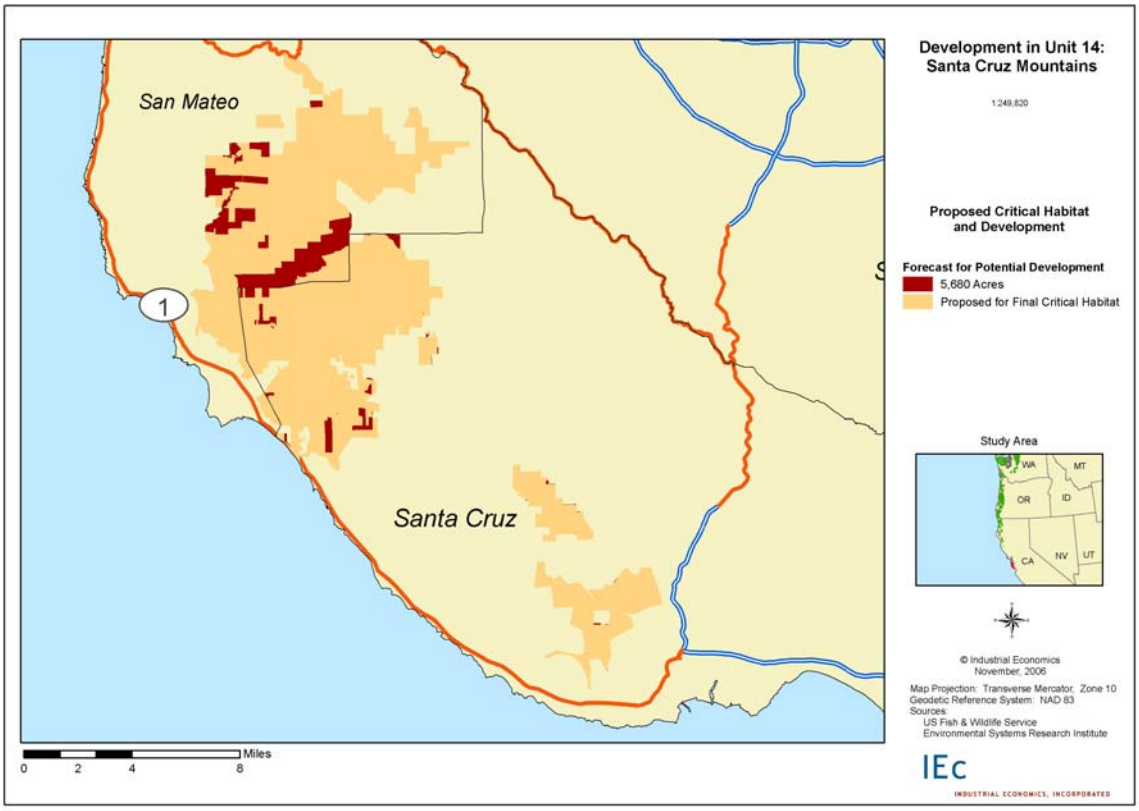
[a] Acreage within San Mateo County was calculated using GIS data of parcels and parcel owners. Because this area is in an unincorporated zoning area, land use data is not available in GIS format. The San Mateo County Planning department provided additional information on the predominant land uses in the area. Personal communication with Joe Camicia, Planner at the San Mateo Planning Department, on March 14, 2007.

[b] Detailed zoning and land use information is available in GIS format for Santa Cruz County. This data was used to calculate the acreage of parcels that are currently undeveloped and suitable for development.

[c] This per acre value is the development value. For Santa Cruz county all parcels are zoned for development, accordingly, the full market value of the land represents the development potential. For areas in San Mateo County, zoning permits forestry and development. As such, timber values have been subtracted from the total per acre market value of this land.

[d] The development value for San Mateo and Santa Cruz County is derived from past sale information of similar parcels. Multiple Listing Service database information provided by Bob Cerelli, Assessor at the San Mateo County Assessor's Department. Personal communication on March 14, 2007. Additional past sales were culled from a Economics Research Associates, "Fiscal Impact Analysis of the Proposed Annexation of the San Mateo County Coastside by the Midpeninsula Regional Open Space District." June 2003.

EXHIBIT 5-8 DEVELOPABLE LANDS IN UNIT 14



SECTION 6 | RECREATION

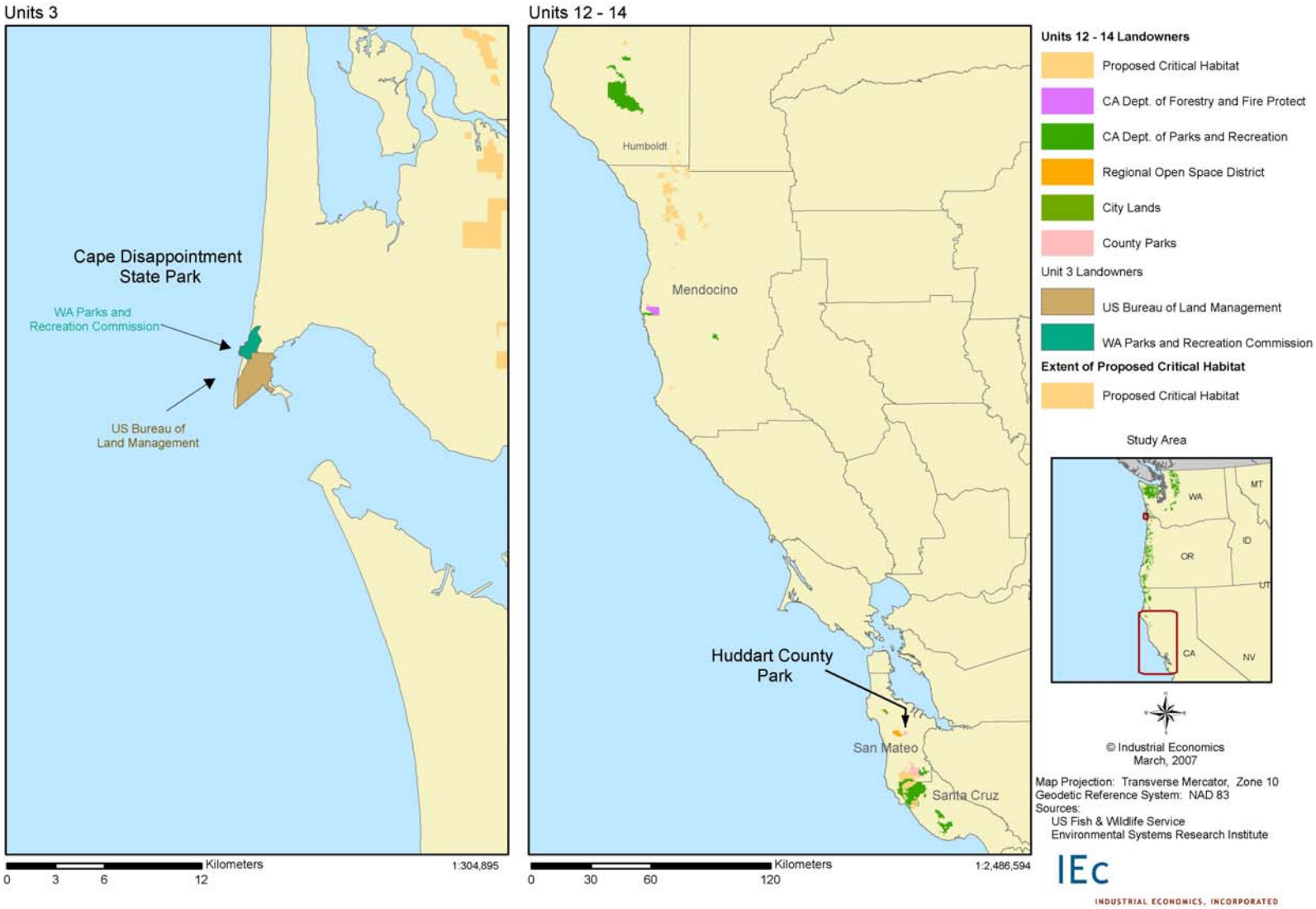
119. Recreational activities that may affect the murrelet and its habitat include trail development or expansion, campground development or expansion, and trail, infrastructure, and campground maintenance. Trail and campground development may present a conservation threat to the murrelet if it involves the removal of old growth trees. Construction associated with infrastructure maintenance may additionally affect the murrelet through increased noise stemming from heavy machinery use or increased pedestrian and bicycle traffic.

120. The primary assumption applied in this analysis is that, at the high end, all future trail expansion or development and group picnic area development in Cape Disappointment State Park (Unit 3) and Huddart County Park (Unit 14) will be prohibited. To quantify impacts associated with restricting recreational infrastructure development, this analysis calculates losses in consumer surplus experienced by recreators forecast to use new and proposed trails in murrelet habitat. That is, this analysis forecasts the number of participant trips expected to use the planned trail and picnic area developments and estimates their value per day for participating in hiking, biking and picnicking activities. The total lost consumer surplus is the product of the number and value of future trips, described in detail in Section 6.2. Approximately 91 percent of the total high-end impacts forecast to recreation activities are welfare impacts resulting from prohibiting future recreational developments.

121. Additionally, this analysis quantifies murrelet conservation efforts associated with park maintenance within State and county parks in Washington and California in Units 3, 12, 13, and 14. These efforts include surveying, monitoring, and installing signage and animal-proof refuse management.

122. The areas proposed for final critical habitat estimated to bear the greatest future economic impact to recreational activities are Cape Disappointment State Park in Unit 3 (46 percent, assuming a seven percent discount rate) and Huddart County Park in Unit 14 (47 percent assuming a seven percent discount rate). Total post-designation costs are presented by subunit in Exhibit 6-3; specific economic impacts to recreational activities in Cape Disappointment State Park and Huddart County Park are presented in Exhibit 6-7. California State Parks constitute 80 percent of the recreational impacts within areas proposed for final critical habitat considered in this section. The areas within the proposed final critical habitat that provide current or potential future opportunity for recreational developments are highlighted in Exhibit 6-1.

EXHIBIT 6-1 STUDY AREA FOR RECREATIONAL ACTIVITIES



123. This section is divided into two parts. The first part presents a summary of impacts to recreation activities within the areas proposed for final critical habitat. The second describes the methods and assumptions employed in this analysis. Each discussion of methodology and assumptions is followed by a presentation of impacts associated with those activities.

6.1 SUMMARY OF IMPACTS TO RECREATION

Pre-designation impacts in areas proposed for final critical habitat

- Undiscounted: $721,000 to $726, 000
- Present value applying a three percent discount rate: $873,000 to $878,000
- Present value applying a seven percent discount rate: $1.15 to $1.16 million

Post-designation impacts in areas proposed for final critical habitat

- Undiscounted:
  - Scenario 1 - $2.0 million
  - Scenario 2 - $23.1 million
- Present value applying a three percent discount rate:
  - Scenario 1 - $1.55 million (annualized $104,000)
  - Scenario 2 - $17.5 million (annualized $1.18 million)
- Present value applying a seven percent discount rate:
  - Scenario 1 - $1.17 million (annualized: $110,000)
  - Scenario 2 - $12.9 million (annualized $1.21 million)

124. Pre-designation impacts are calculated from 1992 to 2006. Pre-designation impacts of murrelet conservation result from surveying, installation of animal-proof garbage cans, installation of informational kiosks for visitors to parks, and the salaries necessary to pay State Park personnel to operate these kiosks.[58] Pre-designation impacts are summarized by subunit in Exhibit 6-2.

[58] Animal proof garbage cans may help reduce the predatory Corvid population. Personal communication with Matt del Carlo, San Mateo County Park Ranger on January 31, 2007. Personal communication with Sam Herzberg, director of Park Planning in San Mateo County on March 8, 2007. Additionally, surveys for Corvids are associated with murrelet conservation. Written communication from Craig Swolgaard, Environmental Scientist, California Department of Parks and Recreation, on March 14, 2007.

EXHIBIT 6-2 TOTAL PRE-DESIGNATION ECONOMIC IMPACTS TO RECREATION (1992 - 2006)

SUBUNIT/ LANDOWNER	TOTAL PRE-DESIGNATION IMPACTS (UNDISCOUNTED)		TOTAL PRE-DESIGNATION IMPACTS (PRESENT VALUE 3%)		TOTAL PRE-DESIGNATION IMPACTS (PRESENT VALUE 7%)	
	LOW	HIGH	LOW	HIGH	LOW	HIGH
Unit 3: Southwestern Washington						
Washington Dept. of Parks and Recreation[a]	$1,660	$1,660	$1,930	$1,930	$2,330	$2,330
US Bureau of Land Management	$5,340	$5,340	$6,190	$6,190	$7,480	$7,480
Unit 13: Mendocino County						
California Dept. of Parks and Recreation	$12,000	$12,000	$15,300	$15,300	$21,500	$21,500
Unit 14: Santa Cruz Mountains						
California Dept. of Parks and Recreation	$500,000	$500,000	$639,000	$639,000	$896,000	$896,000
City of San Francisco Utilities Commission	$56,800	$56,800	$61,600	$61,600	$68,500	$68,500
San Mateo County Parks[b]	$130,000	$130,000	$134,000	$134,000	$139,000	$139,000
Mid-Peninsula Regional Open Space	$15,000	$20,000	$15,500	$20,600	$16,100	$21,400
TOTAL	**$721,000**	**$726,000**	**$873,000**	**$878,000**	**$1,150,000**	**$1,160,000**

Totals may not sum due to rounding

[a] The study area for Unit 3 applies solely to Cape Disappointment State Park, which straddles Washington Department of Parks and Recreation lands and US BLM lands. In this section, the costs were derived and reported for the park as a whole. Total costs for the park were calculated and a per acre value for the park was derived. This per acre value is ascribed to Washington Parks and Recreation lands and US BLM lands based upon acreage within the Cape Disappointment State Park. All exhibits in this section present costs for Unit 3 based upon this weighted value method.

125. Similar to timber and development impacts, post-designation impacts to recreation activities are forecast from 2007 to 2026 according to two scenarios:

- **Scenario 1** impacts represent the low end impact estimate, including costs of surveying and monitoring for the species, refuse management, and providing educational materials and staff time for species management. This scenario does not assume the level of recreational activities in the parks is affected by murrelet conservation.
- **Scenario 2** quantifies upper bound impacts of murrelet conservation by assuming that future recreational trail and picnic ground expansion are prohibited within the areas proposed for final critical habitat. Scenario 2 calculates the lost consumer surplus associated with foregone trips for hiking and picnicking. Trail and

campground developments are considered a threat to this species and this analysis assumes, at the high end, that these developments will be entirely precluded.

126. Only two units proposed for final critical habitat are expected to be affected by the high-end assumption that future recreational developments are prohibited. Ninety-one percent of high-end post-designation impacts are associated with restricting the development of new trails in Cape Disappointment State Park (Unit 3) and the development of new trails and a group picnic area in Huddart County Park (Unit 14). Total post-designation costs are presented, by subunit, in Exhibit 6-3. High-end recreational impacts unique to Cape Disappointment State Park and Huddart County Park are presented in Exhibit 6-7. Additionally, surveying, monitoring, and park staff salaries for the murrelet account for 9 percent of the Scenario 2 post-designation costs estimates.[59]

127. Total forecast impacts to all recreation activities are presented in Exhibit 6-3. All forecast impacts occur within Federal, State, and county parks; California State Parks constitute 80 percent of the recreational areas.

[59] Best Management Practices and time restrictions on work (during murrelet nesting season) were also considered in this analysis, but they do not incur economic impacts. For example, the need for road maintenance or downed-tree removal occurs during rainy season (e.g. landslides). Maintenance is undertaken shortly after these events, and accordingly, is performed during the winter. Additionally, trail construction may be performed during the winter at no additional cost to California State Parks. (Written communication from Craig Swolgaard, Environmental Scientist, California Department of Parks and Recreation, on March 14, 2007. Personal communication with Tim Ramirez, Natural Resources Manager, San Francisco Utilities Commission, on March 6, 2007. Written communication with Cheryl Dillingham, Park Administrator, Humboldt County, California, on March 7, 2007.)

EXHIBIT 6-3 TOTAL POST-DESIGNATION ECONOMIC IMPACTS TO RECREATION (2007 - 2026)

SUBUNIT/ LANDOWNER	TOTAL POST-DESIGNATION COSTS (UNDISCOUNTED)		TOTAL POST-DESIGNATION COSTS (PRESENT VALUE 3%)		TOTAL POST-DESIGNATION COSTS (PRESENT VALUE 7%)		TOTAL POST-DESIGNATION COSTS (ANNUALIZED 3%)		TOTAL POST-DESIGNATION COSTS (ANNUALIZED 7%)	
	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
Unit 3: Southwestern Washington										
Washington Dept. of Parks and Recreation	$21,400	$2,610,000	$19,600	$1,960,000	$17,700	$1,420,000	$1,320	$132,000	$1,670	$134,000
US Bureau of Land Management	$68,600	$8,360,000	$62,700	$6,290,000	$56,700	$4,560,000	$4,220	$423,000	$5,350	$430,000
Unit 12: Humboldt County										
California Dept. of Parks and Recreation	$670,000	$670,000	$528,000	$528,000	$391,000	$391,000	$35,500	$35,500	$36,900	$36,900
Unit 13: Mendocino County										
California Dept. of Parks and Recreation	$200,000	$200,000	$153,000	$153,000	$113,000	$113,000	$10,300	$10,300	$10,700	$10,700
Unit 14: Santa Cruz Mountains										
California Dept. of Parks and Recreation	$600,000	$600,000	$460,000	$460,000	$340,000	$340,000	$30,900	$30,900	$32,100	$32,100
City of San Francisco Utilities Commission	$252,000	$252,000	$192,000	$192,000	$140,000	$140,000	$12,900	$12,900	$13,200	$13,200
San Mateo County Parks[a]	$130,000	$10,300,000	$99,600	$7,920,000	$73,700	$5,860,000	$6,700	$532,000	$6,960	$553,000
Mid-Peninsula Regional Open Space	$40,000	$40,000	$38,800	$38,800	$37,400	$37,400	$2,610	$2,610	$3,530	$3,530
TOTAL	**$2,000,000**	**$23,100,000**	**$1,550,000**	**$17,500,000**	**$1,170,000**	**$12,900,000**	**$104,000**	**$1,180,000**	**$110,000**	**$1,220,000**

Note: Totals may not sum due to rounding.

[a] Huddart County Park is within the San Mateo County Park system. High-end costs presented in this table are primarily from losses in consumer surplus associated with new trail and picnic ground preclusion.

6.2 METHODS, ASSUMPTIONS, AND RESULTS

128. Exhibit 6-4 summarizes murrelet conservation efforts related to recreation activity. With the exception of daily time restrictions, this section quantifies the efforts of implementing murrelet conservation efforts described in Exhibit 6-4. Daily time restrictions were considered in this analysis, however, they are not anticipated to result in economic impacts.[60]

EXHIBIT 6-4 MURRELET CONSERVATION EFFORTS RELATED TO RECREATIONAL ACTIVITIES

MURRELET CONSERVATION EFFORTS	SOURCE
No construction of new trails into undeveloped forest areas at least 80 years old or in forests that buffer nesting habitat.	U.S. Fish and Wildlife Service. 1997. Recovery Plan for the Threatened Marbled Murrelet (*Brachyramphus marmoratus*) in Washington, Oregon, and California. Portland, Oregon. U.S. Fish and Wildlife Service. "Olympic National Forest Program of Activities (2003-2008)." Programmatic Consultation # 01-03-2003-F-0833 with the Olympic National Forest. October 8, 2004.
Daily timing restrictions on activity two hours after dawn and two hours before dusk.	Recovery Plan for the Threatened Marbled Murrelet. U.S. Fish and Wildlife Service. "Headwaters Forest Reserve Resource Management Plan." Formal Consultation # 01-14-2001-963 with the Bureau of Land Management. February 6, 2004. U.S. Fish and Wildlife Service. "Olympic National Forest Program of Activities (2003-2008)." Programmatic Consultation # 01-03-2003-F-0833 with the Olympic National Forest. October 8, 2004. U.S. Fish and Wildlife Service. "Proposed Olympic Discovery Trail Construction." Formal Consultation # 1-03-2004-F-1081 with the Olympic National Park. February 15, 2005.
Monitoring and surveying for murrelet	Recovery Plan for the Threatened Marbled Murrelet. Northwest Forest Plan general murrelet management guidelines.
Post signage and distribute information packets	U.S. Fish and Wildlife Service. "Proposed Last Redwood Corporation Recreational Vehicle Park Project." Formal Consultation # 1-14-2002-1198 with the Army Corps of Engineers. December 10, 2004. U.S. Fish and Wildlife Service. "Proposed Olympic Discovery Trail Construction." Formal Consultation # 1-03-2004-F-1081 with the Olympic National Park. February 15, 2005.

[60] Personal communication with Craig Swolgaard, Environmental Scientist, California Department of Parks and Recreation, March 26, 2007.

MURRELET CONSERVATION EFFORTS	SOURCE
Prohibit feeding animals and install animal proof trashcans. Remove trash regularly from parks.	Recovery Plan for the Threatened Marbled Murrelet. U.S. Fish and Wildlife Service. "Stream Restoration and Trailhead Development Project at the Old B-Mill Deck Site in Redwood National Park." Formal Consultation # 01-14-1999-133 with Redwood National and State Parks. July 15, 1999. U.S. Fish and Wildlife Service. "Olympic National Forest Program of Activities (2003-2008)." Programmatic Consultation # 01-03-2003-F-0833 with the Olympic National Forest. October 8, 2004. U.S. Fish and Wildlife Service. "Proposed Last Redwood Corporation Recreational Vehicle Park Project." Formal Consultation # 1-14-2002-1198 with the Army Corps of Engineers. December 10, 2004. U.S. Fish and Wildlife Service. "Proposed Olympic Discovery Trail Construction." Formal Consultation # 1-03-2004-F-1081 with the Olympic National Park. February 15, 2005. U.S. Fish and Wildlife Service. "Lost Man Creek Erosion Control and Disturbed Land Restoration Plan." Formal Consultation # 8-14-2006-2836 with Redwood National and State Parks. March 2006.

129. In order to bound forecast impacts to recreation activities, this analysis organizes the conservation efforts summarized in Exhibit 6-4 according to low and high-end scenarios. These scenarios are applied to capture the uncertainty regarding how recreational areas may be managed for the benefit of the murrelet, whether monitoring and refuse management will be sufficient or whether future trail development will be precluded.

130. **Scenario 1 –**Scenario 1 is a low-end calculation that quantifies impacts associated with monitoring, surveying, installation of animal-proof trash cans, and salaries for park staff to operate informational kiosks. As highlighted in Exhibit 6-4, some past formal consultations have resulted in this level of project modification without restricting recreational access to parks. This low-end scenario assumes there will be no reduction in consumer surplus associated with changes in recreational opportunity for any of the following reasons:

1. Recreational developments as planned are not a threat to the murrelet (do not result in cutting occupied stands) and therefore proceed unmodified.
2. Trail and campground developments are precluded but this does not affect visitors' enjoyment of the parks. Currently, congestion levels within the areas proposed for final critical habitat are relatively low. It is therefore possible that existing trails may absorb any increased visitation without experiencing significant increased trail congestion. In this case, restricting the development of new trails and campgrounds will not result in a substantive deterioration in quality of hiking, biking, and picnicking.

Over the past six years the two areas with planned recreational developments, Cape Disappointment State Park and Huddart County Park, have not witnessed a marked increase in visitor attendance.[61] Cape Disappointment Park already has a thorough trail network; the proposed addition of approximately 4 miles of trail may not drastically change visitor attendance.[62] Similarly, despite plans for trail expansion in Huddart County Park, it is possible that attendance rates will not be correlated solely with new trail and picnic facilities.

- **Scenario 2 -** The high-end Scenario 2 assumes that, in addition to the impacts associated with monitoring, refuse management, and education programs quantified in Scenario 1, the preclusion of development of new trails and campgrounds will result in lost recreational opportunities. This analysis forecasts potential increases in park attendance associated with the planned new trail and campground developments and quantifies the welfare impacts, in the form of consumer surplus losses, associated with losing the projected increases in visitation. Impacts in this scenario are borne by recreators forecast to enjoy hiking, biking, and picnicking on the foregone trails and campgrounds absent murrelet conservation considerations.

131. These two scenarios bound the potential changes in park management associated with murrelet conservation. Impacts of other murrelet conservation efforts, such as implementing timing restrictions on the trails, are anticipated to be captured between these two extremes of not interrupting visitation levels (Scenario 1), and restricting future additional recreational opportunities altogether (Scenario 2).[63]

6.2.1 QUANTIFYING SCENARIO 1 IMPACTS

132. Scenario 1 of this analysis quantifies the costs undertaken by Federal, State, and county landowners for monitoring, surveying, installation of animal-proof trash cans, and salaries for park staff to operate informational kiosks. Costs are presented by landowner subunit in exhibit 6-5. Cost data for ongoing conservation efforts (such as monitoring and refuse management) was obtained through interviews with landowners and managers who bear these impacts. Scenario 1 values are the costs of continuing current murrelet conservation efforts for the next twenty years.

[61] The California State Park Statistical Report. Fiscal Years 2001 - 2006. Personal communication with Priscilla Alvarez, Huddart County Park Ranger, San Mateo County Department of Parks and Recreation, on March 13, 2007. Personal communication with Sam Herzberg, Director of Park Planning, San Mateo County Department of Parks and Recreation, on March 7, 2007.

[62] Cape Disappointment Draft Environmental Impact Statement. October, 2003. Section II, pp 9-10.

[63] Impacts resulting from time restrictions on recreational activity (as described in Exhibit 6-4) are not anticipated to be significant. Current recreational activities across California State Parks related to trail use two hours after dawn and two hours before dusk is minimal. As such, time restrictions were considered in this analysis, however, because of the insignificant impact they would incur, they are not quantified in this report. Personal communication with Craig Swolgaard. Environmental Scientist, California Department of Parks and Recreation, on March 27, 2007.

EXHIBIT6-5 POST-DESIGNATION SCENARIO 1 IMPACTS (2007 - 2026)

UNIT	ACTION	POST-DESIGNATION IMPACTS (UNDISCOUNTED)	POST-DESIGNATION IMPACTS (PRESENT VALUE 3%)	POST-DESIGNATION IMPACTS (PRESENT VALUE 7%)
3: Southwestern Washington				
Washington Dept. of Parks and Recreation	surveys; salaries; administration costs	$21,400	$19,600	$17,700
US Bureau of Land Management	surveys; salaries; administration costs	$68,600	$62,700	$56,700
Unit 12: Southern Humboldt County				
California Dept. of Parks and Recreation	surveys, installation of animal-proof garbage cans; salaries for park staff operating informational kiosks	$690,000	$528,000	$391,000
Unit 13: Mendocino County				
California Dept. of Parks and Recreation	surveys	$200,000	$153,000	$113,000
Unit 14: Santa Cruz Mountains				
California Dept. of Parks and Recreation	surveys; salaries for park staff personnel operating informational kiosks	$600,000	$460,000	$340,000
City of San Francisco Utilities Commission	annual surveys	$252,000	$192,000	$140,000
San Mateo County	Surveys	$130,000	$99,600	$73,700
Mid-Peninsula Regional Open Space	surveys	$40,000	$38,800	$37,400
TOTAL		**$2,000,000**	**$1,550,000**	**$1,170,000**
Totals may not sum due to rounding				

6.2.2 QUANTIFYING SCENARIO 2 IMPACTS

133. Scenario 2 quantifies impacts associated with lost recreational visits along with the costs of the conservation measures summarized in Exhibit 6-5.

134. Two future recreational developments are forecast within the areas proposed for final critical habitat; Cape Disappointment State Park (Unit 3) and Huddart County Park (Unit 14) management plans propose future expansion of recreational facilities including hiking and biking trails, roads, and picnic areas.[64] This analysis quantifies the lost recreational

[64] Jackson Demonstration State Forest also has a management plan and draft Environmental Impact Report that outline plans for future trail development within areas proposed for final critical habitat. Jackson Demonstration State Forest is discussed later in section 6.2.2.

opportunities (trail use and picnicking) associated with restricting the development of new trails and picnic grounds in areas proposed for final critical habitat.

Lost recreational opportunities in the study area

135. Recreators bear losses in consumer surplus associated with foregone increases in future visitation. Cape Disappointment State Park is in the initial stages of consultation with engineers, stakeholders, and the service regarding the final locations and routes of a new 1.2 mile multi-use (pedestrian, biking, and hiking) trail and a 2.7 mile extension of existing hiking trails. Presently, park staff are estimating the costs of expanding trails in the park. Huddart County Park has completed its management plan and has only recently begun drafting an Environmental Impact Report for its proposed expansion. The management plan proposes multiple options for park expansion. Two options could affect murrelet habitat: the expansion of a group picnic area and the extension of a park trail such that it connects with the regional county trail system.[65]

136. Scenario 2 of this analysis applies the following method to estimate the impacts of lost recreational opportunities. The inputs for the Scenario 2 analysis resulting from each of these analytical steps are presented in Exhibit 6-6.

1. **Identify planned future recreational amenities.**
    - The Cape Disappointment State Park Management Plan describes in detail the mileage of planned new trails.
    - New trail miles and picnic areas are calculated from the Huddart County Park Management Plan and existing park maps.
2. **Forecast number of visitors who would use newly created trails/picnic area over the next 20 years.**
    - Detailed information regarding the annual number of bicyclists, pedestrians, and hikers anticipated to use new trails is included in the Cape Disappointment State Park Management Plan.
    - California State Parks historical statistics, the Huddart County Park Master Plan, and personal communication with the San Mateo Park Planning division are used to estimate current number of hikers and picnickers currently visiting the existing facilities. A ratio of hikers/picnickers to trail miles/picnic grounds is used to infer the distribution of recreators in Huddart County Park, and accordingly, how many hikers and picnickers may be supported by the new trails and picnic area proposed in the management plan. Absent more specific information regarding historic trends in recreation levels in the park, this method forecasts foregone participation assuming that recreator density will remain constant across the park in the future.

[65] Huddart County Park Master Plan, pp 17, 64.

3. **Determine the willingness to pay for hiking per participant -** This analysis conducts a benefits transfer from an existing literature review to value lost consumer surplus associated with precluding expansion of recreational opportunities. In 2005 the U.S. Forest Service conducted a literature review to update outdoor recreation use values on National Forests and other public lands.[66] The report reviews 30 years of literature on net economic values of outdoor recreation and provides an average net willingness to pay (consumer surplus) for 30 recreation activities by region of the U.S. This analysis applies average consumer surplus per day values for the Pacific Coast of "general recreation," hiking, and picnicking.[67] The following text box highlights the steps for conducting benefits transfer.

4. **Calculate the total decreased consumer surplus value associated with the lost recreational opportunities** - This value is the product of the number of anticipated trail/picnic users multiplied by the average per-person consumer surplus value. The Cape Disappointment State Park attendance projections (outlined in the management plan) are incorporated into this calculation over twenty years. Huddart County Park attendance is not anticipated to increase dramatically over the next twenty years, and annual trail and picnic ground users are assumed to remain constant.

[66] Loomis, John. October 2005. Updated Outdoor Recreation Use Values on National Forests and Other Public Lands. United States Department of Agriculture General Technical Report PNW-GTR-658.

[67] Some trails allow hiking and biking opportunities, as opposed to just hiking. Foregone recreation on these mixed use trails was valued at the average "general recreation" number absent specific information on the specific numbers of hikers and bikers that may use the trail. The "general recreation" consumer surplus value per day ($34.80, in $2007) is approximately the average of the consumer surplus values for hiking ($24.30, in $2007) and mountain biking ($51.87, in $2007).

Steps for Conducting Benefits Transfer

To estimate the consumer surplus value of a hiking or picnicking trip, this analysis applies a benefits transfer approach. Benefits transfer involves adapting research conducted to estimate economic values under one set of circumstances to address a similar policy question. In this manner, existing valuation research is combined with site-specific data and information to develop a "transferred" estimate. Benefits transfer has been widely applied in policy analysis and is approved for use within the Office of Management and Budget (OMB) guidelines for preparing economic analyses. In this case, existing estimates of consumer surplus value for hiking, general recreation, and picnicking trips are multiplied by estimates of the number of trips not taken due to murrelet conservation to estimate consumer surplus losses.

ice in the conduct of benefits transfer generally involves five general steps:[a]

- **Describe conditions to be valued:** Identify and describe in detail the valuation scenario, which in this case involves the nature and extent of hiking and picnicking opportunities in the study area, the nature and extent of management restrictions present, and the manner in which these restrictions may affect recreators' behavior.
- **Identify relevant research:** Conduct a detailed search for relevant research in the economics literature.
- **Review research for quality and applicability:** Review relevant research carefully for quality and specific applicability. In this case, the studies identified all valued forest-related recreation, such as hiking, biking, and picnicking, on the Pacific Coast. These studies were aggregated for the purpose of benefits transfer in Loomis' literature review from which our consumer surplus values derive.[b]
- **Transfer economic values:** Apply the valuation information identified to the conditions being valued; in this case, to estimated changes in welfare associated with fewer hiking and picnic trips to within areas proposed for final critical habitat.
- **Address uncertainty:** Evaluate assumptions made in the process of transferring economic values and the sensitivity of final impact estimates to such assumptions. In this case, specific consumer surplus values for trips associated with "mixed use trails" and picnicking were not available; this analysis therefore applied the "general recreation" values for these trips.

[a] U.S. Environmental Protection Agency (EPA), *Guidelines for Preparing Economic Analyses, EPA 240-R-00-003*, pp. 86-87, September 2000; and Office of Management and Budget (OMB), *Circular A-4*, pp. 24-26, September 17, 2003.

[b] Loomis, John. October 2005. Updated Outdoor Recreation Use Values on National Forests and Other Public Lands. United States Department of Agriculture General Technical Report PNW-GTR-658.

EXHIBIT 6-6 SCENARIO 2 INPUTS

PARK	TYPE OF ACTIVITY	TRAIL MILES/PICNIC SITES	ANTICIPATED ANNUAL USERS	CONSUMER SURPLUS VALUE PER PARTICIPANT PER DAY ($2007)
Unit 3: Cape Disappointment State Park	Multi-use trail (pedestrian, hiking, bicycle)	1.2 miles[a]	9,375[a]	$34.80[c]
Unit 3: Cape Disappointment State Park	Hiking	2.7 miles[a]	5,000[a]	$24.30[c]
Unit 14: Huddart County Park	Hiking	14 miles[d]	2,381[b]	$24.30[c]
Unit 14: Huddart County Park	Picnicking	5 picnic sites[e]	13,333[b]	$34.80[c]

Sources:

[a] Cape Disappointment State Park Master Plan. Draft Environmental Impact Statement, October 2003. (Section III, p. 63) These are the anticipated number of users and new miles of trail according to the "proposed action" plan.

[b] Personal communication with Priscilla Alvarez, Huddart County Park Ranger, San Mateo County Department of Parks and Recreation, on March 13, 2007. Personal communication with Sam Herzberg, Director of Park Planning, San Mateo County Department of Parks and Recreation, on March 7, 2007.

[c] This is the average consumer surplus value per person per day general recreation ($34.80) and hiking ($24.30) activities. These values are derived from a literature review of empirical studies from 1967 to 2003 estimating outdoor recreation values in forests in the Pacific Coast region. The general recreation value based on nine regional empirical studies; the hiking value was based on 49 regional empirical studies. (Loomis, John. October 2005. Updated Outdoor Recreation Use Values on National Forests and Other Public Lands. United States Department of Agriculture General Technical Report PNW-GTR-658.)

[d] Huddart County and Wunderlich Park Master Plan, May 2006. Trail miles calculated from Figure 10, "Huddart Park Trail Recommendations." Available at the San Mateo County Park Planning Division website: http://www.eparks.net/smc/department/home/0,2151,5556687_10575186,00.html#HudWund. Accessed March 27, 2007.

[e] Number of current picnic sites is available on the Huddart County Park webpage: http://www.eparks.net/smc/department/home/0,,5556687_12313305_12328471,00.html accessed March 27, 2007.

137. Exhibit 6-7 identifies the total consumer surplus losses by unit and landowner associated with the high-end impact assumption that future recreational developments are precluded in the areas proposed for final critical habitat. The economic impact estimates in Exhibit 6-7 are summed with those quantified in Scenario 1 (Exhibit 6-5) to calculate the total Scenario 2 impacts presented in Exhibit 6-3.

EXHIBIT 6-7 CONSUMER SURPLUS LOSSES ASSOCIATED WITH PROHIBITING FUTURE RECREATIONAL DEVELOPMENTS

SUBUNIT	RECREATIONAL WELFARE COSTS UNDER SCENARIO 2 (2007-2026)				
PROPOSED FOR CRITICAL HABITAT DESIGNATION	UNDISCOUNTED	PRESENT VALUE 3%	PRESENT VALUE 7%	ANNUALIZED 3%	ANNUALIZED 7%
Unit 3: Southwestern Washington					
Washington Dept. of Parks and Recreation (Cape Disappointment State Park)	$2,590,000	$1,940,000	$1,400,000	$131,000	$132,000
US Bureau of Land Management (Cape Disappointment State Park)	$8,290,000	$6,230,000	$4,500,000	$419,000	$425,000
Unit 14: Santa Cruz Mountains					
San Mateo County (Huddart County Park)	$10,210,000	$7,820,000	$5,780,000	$526,000	$546,000
TOTAL	**$21,100,000**	**$16,000,000**	**$11,700,000**	**$1,080,000**	**$1,100,000**
Totals may not sum due to rounding					

6.2.2 ADDITIONAL CONSIDERATIONS

138. Scenario 2 of this analysis assumes visitors who are not able to enjoy the increased trail network or group picnic site lose the entire value of a day's recreation. It is possible, however, that visitors may continue to visit these parks as forecast regardless of whether or not additional trails or picnic amenities are provided, as described in Scenario 1 assumptions. For example, Cape Disappointment State Park is recognized as a unique park not because of its trail network, but because it provides camping and lodging facilities along the beach (not within the areas proposed for final critical habitat). Similarly, there are a variety of comparable regional trails and recreational areas throughout Huddart County Park that will continue to attract visitors.

Jackson Demonstration State Forest

139. Jackson Demonstration State Forest is located in Mendocino County, CA (Unit 13). This State forest is operated by the California Department of Forestry and Fire Protection and encompasses approximately 50,000 acres; 5,000 acres are proposed for final critical habitat. Jackson Demonstration State Forest has developed a management plan and Draft Environmental Impact Report, both of which discuss possibilities for limited silvicultural activity and trail expansion in the area proposed for final critical habitat (silvicultural

activities and surveying are discussed in Section 4 of this analysis). In 2001, The Campaign to Restore Jackson State Redwood Forest filed a lawsuit against Jackson Demonstration State Forest in an attempt to curtail all commercial timber harvesting operations on public lands.[68] Following the lawsuit, all development and timber harvesting activities have ceased.[69] Although trail development may occur elsewhere on the 50,000 acre forest, trail development is expected to be minimal within the designated area.[70] Future trail expansion hinges on the outcome of the lawsuit and at the moment is highly uncertain. Additionally, the impact of precluding recreational trail development is not considered in this section for the following reasons:

- Jackson Demonstration State Forest is not actively managed for recreational activities (it is primarily a timber harvesting and research forest), and, as such, information on current and future participation in recreational is equivocal.
- Equestrians, hunters, hikers, and bicyclists use a variety of mapped and unmapped trails, roads, seasonal roads, and old logging roads. To this end, records on the use of trails or demand for trails within the designated area are not actively updated.
- According to the draft management plan, Jackson Demonstration State Forest recreational activities are, "…informal, free of charge, unsupervised, and diverse." The current draft management plan, moreover, seeks to maintain the current rustic experience.[71]

[68] Campaign to Restore Jackson State Redwood Forest: http://www.jacksonforest.com/Campaign/campaign.htm, accessed March 8, 2007.

[69] Personal communication with Marc Jameson, Deputy Chief of Jackson Demonstration State Forest, California Department of Forestry and Fire Protection, on February 28, 2007.

[70] Written communication with Marc Jameson, Deputy Chief Jackson Demonstration State Forest, California Department of Forestry and Fire Protection February 1 and 28, 2007

[71] Jackson Demonstration State Forest, California Department of Forestry and Fire Protection. Jackson Demonstration State Forest Draft Management Plan, page 5. January 22, 2007.

SECTION 7 | ECONOMIC IMPACTS ON OTHER ACTIVITIES

140. This section discusses potential impacts of murrelet conservation efforts on transportation, mining, and fire management activities taking place within areas proposed for final critical habitat. While no transportation, mining, and fire management projects are forecast within the areas proposed for final critical habitat, because these activities are considered conservation threats to the murrelet the following sections discuss qualitatively by activity these activities and murrelet conservation efforts that may be undertaken to avoid, compensate for, or mitigate each threat.

7.1 TRANSPORTATION ACTIVITIES

141. Transportation activities can affect the murrelet either by clearing trees that are potentially suitable for nesting or by creating an increase in noise disturbance. For example, the Washington Administrative Code 222-24-030 (11) describes the following provisions for disturbance avoidance for the murrelet:

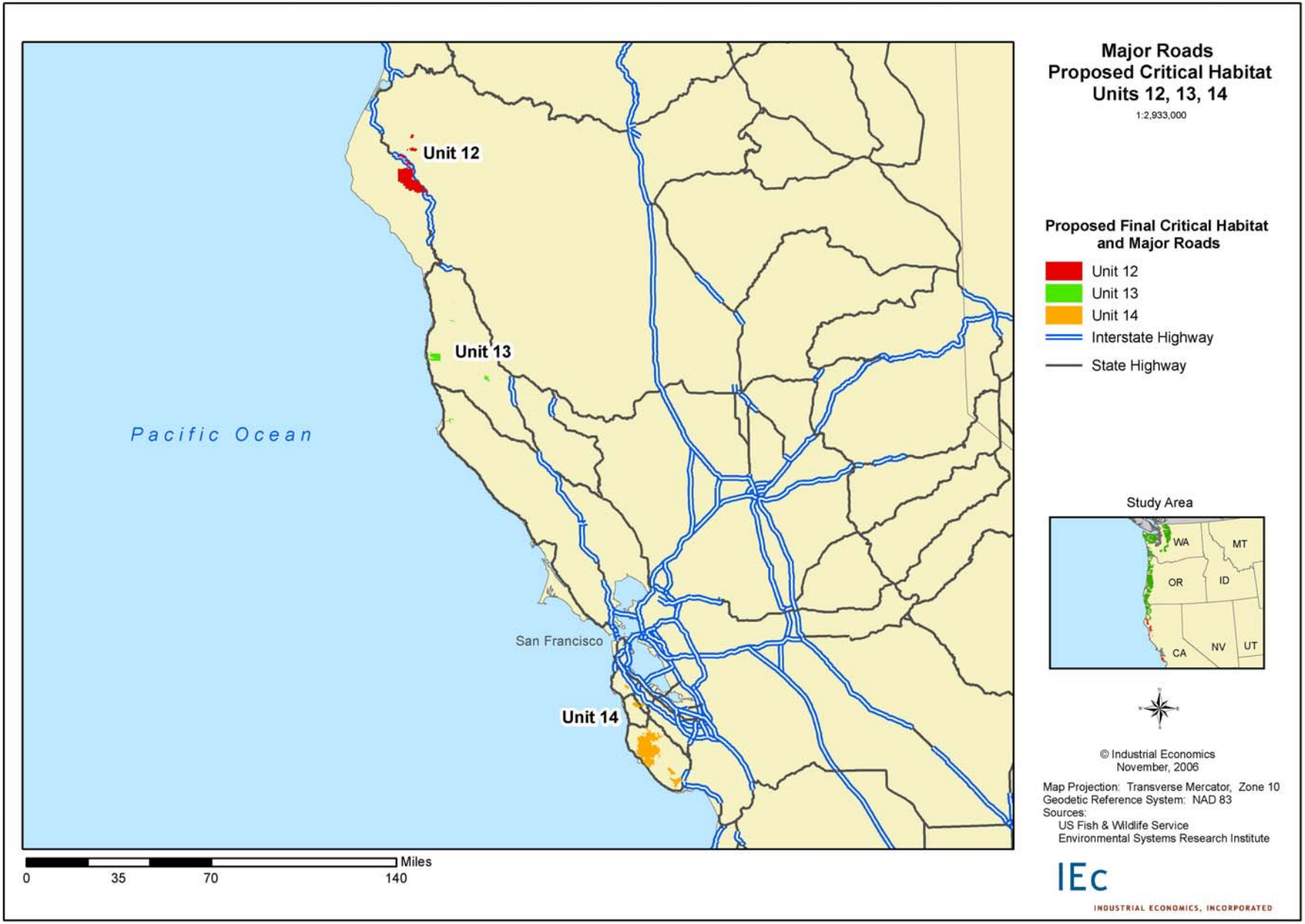
- Road construction and operation of heavy equipment shall not be allowed within 0.25 mile of an occupied marbled murrelet site during the daily peak activity periods within the critical nesting season; and
- Blasting shall not be allowed within 0.25 mile of an occupied marbled murrelet site during the critical nesting season.

142. No pre-designation impacts on transportation-related activities were identified. In a study of representative past section 7 consultations for the murrelet, various transportation projects were deemed either unlikely to affect or unlikely to jeopardize the murrelet. Generally trees surrounding the projects were found either to be unoccupied or not suitable for nesting habitat.[72] Other past transportation projects are not located within the area proposed for final critical habitat.

143. At this time, no post-designation impacts on transportation-related activities are identified. A review of State Department of Transportation plans did not identify any future projects falling within areas proposed for final critical habitat. The areas proposed for final critical habitat are characterized by rural old-growth forest, and there are only a few major roads located within the designation (see Exhibit 7-1). The primary major

[72] See, for example, U.S. Fish and Wildlife Service. "Proposed Confusion Hill Bypass Project, on US Highway 101, Mendocino County." Formal Consultation # 01-14-2004-2054 with the Federal Highway Administration. November 14, 2005; U.S. Fish and Wildlife Service. "Route 101 Cushing Creek Realignment Project in Del Norte County, California." Formal Consultation # 01-14-1996-F-3 with the Federal Highway Administration. December 6, 2006.

EXHIBIT 7-1 MAP OF MAJOR ROADS LOCATED WITHIN AREAS PROPOSED FOR FINAL CRITICAL HABITAT



road running through the designation is US highway 101, which runs up the Pacific coast. However, no projects associated with this highway are forecast within areas proposed for final critical habitat.

7.2 MINING ACTIVITIES

144. Mining activities can affect the murrelet either through clearing land or through creating noise disturbance. While the Service has consulted with mining operations in the past about mitigating noise disturbance to the murrelet, these mines are not located within the current areas proposed for final critical habitat. Thus, this analysis does not include impacts associated with these consultations and their recommended conservation efforts.

145. As shown in Exhibit 7-2, there are four currently producing mines located within the area proposed for final critical habitat. Three past producers also are located within the area; however, because these mines are no longer active, this analysis does not forecast that these mines will experience impacts associated with murrelet conservation.

EXHIBIT 7-2 MINES LOCATED WITHIN AREAS PROPOSED FOR FINAL CRITICAL HABITAT

MINE NAME	COUNTY	STATE	PRIMARY_CO	TYPE OF MINING
Stockel Bar	Fortuna	CA	Sand and Gravel	Unknown
Barth Falls 1	Clatsop	OR	Crushed Stone	Surface
Miami River Quarry	Tillamook	OR	Crushed Stone	Surface
Unnamed Pit	Polk	OR	Crushed Stone	Surface
Past Producers				
Barth Falls 1	Clatsop	OR	Stone	Unknown
Miami River Quarry	Tillamook	OR	Stone	Unknown
Basalt Quarry	Polk	OR	Stone	Unknown

146. Lands already cleared for existing mining operations do not contain the necessary primary constituent elements of murrelet habitat as defined in the Proposed Rule, and thus are not included in the study area.[73] However, a currently producing mine located sufficiently close to occupied habitat may be required to consult on possible noise disturbance related to crushing and loading activities. From a review of past section 7 consultations, past conservation measures associated with currently producing mines included seasonal restrictions such as:

- Restricting loading activities to between the hours of 9:00am and 5:30pm from March to September;
- Limiting the number of truckloads in any consecutive two calendar day period between March and September;

[73] U.S. Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Marbled Murrelet; Proposed Rule, 71 FR 176, September 12, 2006.

- Moving some loading operations to maintain appropriate sound barriers; and
- Service monitoring to determine ambient noise levels.

Typically impacts associated with seasonal restrictions such as these can be mitigated with advanced planning, resulting in negligible impacts.

147. No mineral occurrences or prospective mines were located within areas proposed for final critical habitat, suggesting that new mining operations are unlikely.[74] Thus, no post-designation impacts to mining activities are forecast.

7.3 FIRE MANAGEMENT ACTIVITIES

148. Forest fires pose a threat to the murrelet because of the potential for widespread habitat destruction. The frequency and intensity of catastrophic wildfire has been increasing over time. The primary contributor to the recent increases in wildland fire and intensity is widely believed to be the long-standing practice of fire suppression by United Stated Forest Service (USFS) and other land management agencies. As fire suppression practices decreased the frequency of low-intensity fires that historically removed fuels from the forest floor, the number of "stand-replacing," high-intensity fires has increased.[75]

149. These fire management practices are beginning to change under plans such as the "National Fire Plan," jointly implemented by the United States Department of Agriculture (USDA) and the Department of the Interior.[76] The National Fire Plan calls for a substantial increase in the number of forested acres treated annually to reduce hazardous fuels with a focus on areas "where human life, property, and natural resources are in imminent danger from catastrophic wildfire."[77] These areas are also known as Wildlife-Urban Interface (WUI) areas.

150. WUI areas generally include areas where houses meet or intermingle with undeveloped wildland vegetation. This makes a WUI area a focal point for human-environment conflicts such as wildland fires.[78] Based on an analysis of WUI data, overlap of the proposed CHD with WUI areas is limited. Approximately 11,900 acres of WUI areas fall

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[74] IEc analysis of GIS data from the Washington Department of Natural Resources, Division of Geology and Earth Resources, the California Division of Transportation System Information, and the US Bureau of Mines.

[75] "Wildfire history and ecology," http://www.cpluhna.nau.edu/Biota/wildfire.htm, accessed February 17, 2004. National Interagency Fire Center, Wildlands Fire Statistics, 1960-2002, www.nifc.gov/stats/wildlandfirestats.html, accessed February 16, 2004.

[76] The National Fire Plan originated in a report to the President entitled, *Managing the Impacts of Wildfire on Communities and the Environment: A Report to the President in Response to the Wildfires of 2000*.

[77] USFS 2001. Biological Opinion on the AUSFS Proposed Wildland/Urban Interface (WUI) .

[78] "The Wildland-Urban Interface," University of Wisconsin, Department of Forest Ecology & Management, Spatial analysis for conservation and sustainability (SILVIS) Lab, Online at: http://silvis.forest.wisc.edu/projects/WUI_Main.asp, Accessed on: November 30, 2004.

within areas proposed for final critical habitat (see Exhibit 7-3).[79] These 11,900 WUI acres comprise only 5.3 percent of the total acres proposed as final critical habitat. Therefore, the area where increased fire management may represent a threat to the murrelet is limited.

151. In addition, many land management agencies have been allowed to implement prescribed burns and other types of thinning projects to mitigate the risk of catastrophic wildfire within areas proposed for final critical habitat. In section 7 consultations on these types of projects, the Service generally has found no adverse affect to the murrelet, and the projects have gone forward.[80] In fact, the section 7 consultation process has been streamlined as part of the National Fire Plan. As part of the National Fire Plan effort, Action Agencies published new regulations for implementing section 7 consultation requirements in December 2003.

152. These regulations provide an alternative process that "eliminates the need to conduct informal consultation and eliminates the need to provide written concurrence" from the Service for those National Fire Plan actions that the Action Agency determines are "not likely to adversely affect (NLAA) any listed species or its designated critical habitat." As such, it is unlikely that fire management practices in areas proposed for final critical habitat would change; therefore, this analysis does not forecast any post-designation impacts associated with fire management.

[79] In estimating the WUI areas that overlap with the proposed CHD, this analysis excluded the following non-WUI areas: wildland intermix, uninhabited with vegetation, uninhabited and no vegetation, wildland with no vegetation, low density with no vegetation, medium density with no vegetation, and high density with no vegetation.

[80] See, for example, U.S. Fish and Wildlife Service. "Six Rivers National Forest's Forest-wide Prescribed Burn Program." Formal Consultation # 01-01-1995-F-138 with the Six Rivers National Forest. December 6, 2006; U.S. Fish and Wildlife Service. "Proposed Forest-Wide Thinning and Fuels Hazard Reduction Projects." Informal Consultation # 8-14-2004-2168 with the Six Rivers National Forest. September 2006.

EXHIBIT 7-3 WILDLAND URBAN INTERFACE AREAS IN AREAS PROPOSED FOR FINAL CRITICAL HABITAT

UNIT	OWNER	OVERLAP WITH WUI (ACRES)	PERCENTAGE OVERLAP WITH AREAS PROPOSED FOR FINAL CRITICAL HABITAT
1	Private	305	17.2%
2	Private	0	0.0%
	Lummi Nation	0	0.0%
	The Nature Conservancy	0	0.0%
	Lummi/Nature Conservancy	0	0.0%
3	Private	20	0.1%
	Grays Harbor County	0	0.0%
	Washington State Parks and Recreation Commission	0	0.1%
	U.S. Bureau of Land Management	15	1.3%
4	Private	8	2.3%
	State of Oregon Department of Forestry	1849	2.7%
5	State of Oregon Department of Forestry	0	0.0%
6	State of Oregon Department of Forestry	0	0.0%
11	Private timber company	0	0.0%
12	California Department of Fish and Game	0	0.0%
	California Department of Parks and Recreation	2,660	6.7%
	Humboldt County	0	0.0%
13	Private[2]	0	0.0%
	California Department of Parks and Recreation	1,050	38.9%
	California Department of Forestry and Fire Protection	631	11.5%
14	Private[2]	418	17.0%
	California Department of Parks and Recreation	4,070	7.3%
	San Mateo County	708	38.8%
	City: Golden Gate National Recreation Area	121	12.4%
	Total	**11,900**	**5.3%**

Table may not sum due to rounding
Source:
University of Wisconsin, Department of Forest Ecology & Management, Spatial analysis for conservation and sustainability (SILVIS) Lab, Online at: http://silvis.forest.wisc.edu/projects/WUI_Main.asp

REFERENCES

5 U.S.C. ' 601 et seq.

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APPENDIX A | SECTION 7 ADMINISTRATIVE CONSULTATION COSTS

153. This appendix presents administrative costs of consultations undertaken according to section 7 of the Act associated with the areas proposed for critical habitat for the murrelet (including areas proposed for final critical habitat and areas proposed for exclusion according to section 4(b)(2) of the Endangered Species Act). First, this appendix defines the types of administrative costs quantified. Next, it presents the estimated number of pre-designation and post-designation consultations associated with the areas proposed for final critical habitat by activity across the study area.

A.1 CATEGORIES OF CONSULTATIONS

154. Section 7(a)(2) of the Act requires Federal agencies to consult with the Service whenever activities that they undertake, authorize, permit, or fund may affect a listed species or designated critical habitat. There are two scenarios under which the designation of critical habitat can result in section 7 consultations with the Service beyond those required by the listing. These include:

- New consultations, which can occur when activities involving a Federal nexus are proposed in critical habitat not thought to be currently occupied by the species; and
- Re-initiations of consultations, which result when consultations that previously occurred under the listing are re-initiated due to new information or circumstances generated by the designation.

In some cases, consultations will involve the Service and another Federal agency only, such as the U.S. Forest Service. Consultations may also include a third party involved in projects on non-Federal lands with a Federal nexus, such as State agencies and private landowners.

155. During a consultation, the Service, the Federal agency, and the third party applying for Federal funding or permitting (if applicable) communicate in an effort to minimize potential adverse effects to the species and/or to the proposed critical habitat. Communication between these parties may occur via written letters, phone calls, in-person meetings, or any combination of these. The duration and complexity of these interactions depends on a number of variables, including the type of consultation, the species, the activity of concern, the Federal agency, whether a private applicant is involved, and the potential effects to the species and designated critical habitat associated with the activity that has been proposed.

156. Section 7 consultations with the Service may be either informal or formal. *Informal consultations* consist of discussion between the Service, the Federal agency, and the

applicant concerning an action that may affect a listed species or its designated critical habitat. The process is designed to identify and resolve potential concerns at an early stage in the planning process. By contrast, a *formal consultation* is required if the Federal agency determines that its proposed action may or will adversely affect the listed species or designated critical habitat in ways that cannot be resolved through informal consultation. The formal consultation process results in the Service's determination in a Biological Opinion of whether the action is likely to jeopardize a species or adversely modify critical habitat, and recommendations to minimize those impacts. Regardless of the type of consultation or proposed project, section 7 consultations can require substantial administrative effort on the part of all participants.

A.2 ESTIMATED COSTS OF CONSULTATIONS AND TECHNICAL ASSISTANCE

157. Estimates of the cost of an individual consultation and technical assistance request were developed from review and analysis of historical section 7 files from a number of Service field offices around the country conducted in 2002. These files addressed consultations conducted for both listings and critical habitat designations. Cost estimates are based on an average level of effort of low, medium, or high complexity, multiplied by the appropriate labor rates for staff from the Service and other Federal agencies.

158. The administrative costs estimates presented in this section take into consideration the level of effort of the Service, the Federal agency, and the applicant, as well as the varying complexity of the consultation. Costs associated with these consultations include the administrative costs associated with conducting the consultations, such as the costs of time spent in meetings, preparing letters, and the development of a biological opinion. Exhibit A-1 provides a summary of the estimated administrative costs per consultation effort.

EXHIBIT A-1 ESTIMATED ADMINISTRATIVE COSTS OF CONSULTATION (PER EFFORT), 2006$

CONSULTATION TYPE	SERVICE	FEDERAL AGENCY	THIRD PARTY	BIOLOGICAL ASSESSMENT
Informal	$2,250	$2,900	$2,050	$2,000
Formal	$5,050	$5,750	$3,500	$4,800

Source: IEc analysis based on data from the Federal Government Schedule Rates, Office of Personnel Management, 2006, and a review of consultation records from several Service field offices across the country conducted in 2002.
Note: Estimates reflect average hourly time required by staff.

A.3 SUMMARY OF PRE-DESIGNATION ADMINSTRATIVE COSTS

159. Since the listing of the murrelet in 1992, there have been more than 2,800 section 7 consultations. Because the exact locations of each of the associated projects is unknown, the costs associated with these consultations are not divided across the landowner subunits of the study area. Instead, costs are quantified in a "multiple units" line item of the cost model for both areas proposed for final critical habitat and areas proposed for exclusion according to section 4(b)(2) of the Act, and are included in the total impact estimates. Estimates are distributed across areas proposed for final critical habitat and proposed for exclusion according to section 4(b)(2) according to the relative percentage of land area covered by those categories; that is six percent are assumed to have occurred in areas proposed for final critical habitat and 94 percent in areas proposed for exclusion according to section 4(b)(2). Pre-designation administrative impacts (quantified from 1992 to 2006) are estimated to have been approximately $2.67 million in areas proposed for final critical habitat and $41.9 million in areas proposed for exclusion according to section 4(b)(2). A breakdown of these pre-designation consultations by activity is provided in Exhibit A-2.

A.4 SUMMARY OF POST-DESIGNATION ADMINISTRATIVE COSTS

160. This analysis forecasts informal and formal consultations by activity based on review of historical consultations and information received from the Service regarding frequency of future consultations. Consultations are distributed by activity based on information provided by the Service and the distribution of past section 7 consultations.[81] Distribution and frequency of past consultations is considered a reliable indicator of the distribution and frequency of future consultations because the majority of these areas has been designated critical habitat for the murrelet since 1996.[82] Similar to pre-designation consultations, six percent are assumed to have occurred in areas proposed for final critical habitat and 94 percent in areas proposed for exclusion according to section 4(b)(2). Accordingly, this analysis estimates post-designation costs of consultation in areas proposed for final critical habitat may be approximately $4.16 million in undiscounted dollars (present value of $2.2 million applying a seven percent discount rate or $3.1 million applying a three percent discount rate). In areas proposed for exclusion according to section 4(b)(2), costs are estimates to be approximately $65.2 million in undiscounted dollars (present value of $34.5 million applying a seven percent discount rate or $48.5 million applying a three percent discount rate). A breakdown of these post-designation consultations by activity is presented in Exhibit A-3.

161. The number of estimated post-designation consultations for activities within a given subunit is highly uncertain. Specific information on the geographic distribution of past consultations is not readily available and the exact locations of specific future projects is

[81] Written communications from the Service, Western Washington Field Office, Oregon Field Office, and the Arcata Field Office, April 2, 2007.

[82] Critical habitat was first designated for the marbled murrelet in 1996 (61 FR 102).

speculative. As a result, administrative consultation costs are quantified in "multiple units" line items of the cost model for areas proposed for final critical habitat and areas proposed for exclusion according to section 4(b)(2), and are included in the total impact estimates.

EXHIBIT A-2. PRE-DESIGNATION CONSULTATION NUMBERS BY ACTIVITY, 1992-2006

MULTIPLE SUBUNITS	TYPE OF CONSULT	SILVI-CULTURE	RECREA-TION	TRANSPOR-TATION	MINING	FIRE MGMT	ENERGY & UTILITIES	MILITARY	DEVELOP-MENT	RESTORA-TION	OTHER	TOTAL
Proposed for final critical habitat	Formals	22	6	29	1	0	8	1	2	28	73	170
	Informals	13	2	2	0	1	0	0	0	1	1	19
Total Impacts		$427,000	$99,300	$446,000	$12,500	$4,270	$113,000	$17,900	$36,600	$427,000	$1,090,000	**$2,670,000**
Proposed for exclusion	Formals	344	91	451	13	0	119	19	39	443	1140	2658
	Informals	203	26	36	0	9	0	0	0	14	17	305
Total Impacts (Undiscounted)		$6,690,000	$1,560,000	$6,980,000	$196,000	$66,900	$1,780,000	$280,000	$574,000	$6,700,000	$17,100,000	**$41,900,000**

Note: Table may not sum due to rounding.

EXHIBIT A-3. POST-DESIGNATION CONSULTATION NUMBERS BY ACTIVITY, 2007-2026

MULTIPLE SUBUNITS	TYPE OF CONSULT	SILVI-CULTURE	RECREA-TION	TRANSPOR-TATION	MINING	FIRE MGMT	ENERGY & UTILITIES	MILITARY	DEVELOP-MENT	RESTORA-TION	OTHER	TOTAL
Proposed for final critical habitat	Formals	21	8	48	1	0	13	2	4	48	123	270
	Informals	19	0	0	0	0	0	0	0	0	0	19
Total Impacts		$466,080	$126,190	$718,667	$21,545		$196,979	$30,778	$63,095	$712,511	$1,826,676	**$4,160,000**
Proposed for exclusion	Formals	335	133	756	23	0	207	32	66	750	1923	4225
	Informals	301	0	0	0	0	0	0	0	0	0	301
Total Impacts (Undiscounted)		$7,301,912	$1,976,976	$11,259,118	$337,532	$0	$3,086,011	$482,189	$988,488	$11,162,680	$28,617,929	**$65,200,000**

Note: Table may not sum due to rounding.

APPENDIX B | SMALL BUSINESS ANALYSIS AND ENERGY IMPACT ANALYSIS

162. This appendix considers the extent to which the impacts discussed in the previous Sections could be borne by small businesses and the energy industry. The analysis presented in Section B.1 is conducted pursuant to the Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996. Information for this analysis was gathered from the Small Business Administration (SBA), U.S. Census Bureau, and the Risk Management Association (RMA). The energy analysis in Section B.2 is conducted pursuant to Executive Order No. 13211.

B.1 IMPACTS TO SMALL ENTITIES

163. When a Federal agency proposes regulations, the RFA requires the agency to prepare and make available for public comment an analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions).[81] No initial regulatory flexibility analysis (IRFA) is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. SBREFA amended the RFA to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have significant economic impact on a substantial number of small entities. To assist in this process, this appendix provides a screening level analysis of the potential for murrelet conservation efforts to affect small entities.

B.1.1 SUMMARY OF IMPACTS ON SMALL ENTITIES

164. This screening analysis is based on the estimated impacts associated with the proposed rulemaking as described in Sections 3 through 6 of this analysis. The analysis evaluates the potential for economic impacts related to several land use categories, including:

- Timber management,
- Development, and
- Recreation..

165. Development impacts quantified in this Section 5 report are anticipated to be borne by the landowners, which are large timber companies and private residential landowners. The quantified recreation impacts, as described in Section 6 of this report are consumer surplus losses expected to be borne by recreators and not small entities.

[81] 5 U.S.C. 601 et seq.

166. The remainder of this screening analysis therefore focuses on impacts to timber management activities, which may be borne by small timber-related businesses. As described in Section 4 of this report, the high-end estimate of impacts to timber activities are decreased land values associated with limiting the future use of the land by prohibiting timber harvest. The decreased land value impacts are anticipated to be borne by the landowners, which are primarily timber companies.

B.1.2 DETAILED ANALYSIS OF IMPACTS TO SMALL ENTITIES

167. This analysis is intended to improve the Service's understanding of the effects of the proposed rule on small entities and to identify opportunities to minimize these impacts in the final rulemaking.

168. The Endangered Species Act (Act) requires the Service to designate critical habitat for threatened and endangered species to the maximum extent prudent and determinable. Section 4(b)(2) of the Act requires that the Service designate critical habitat "on the basis of the best scientific data available and after taking into consideration the economic impact, the impact on national security, and any other relevant impacts, of specifying any particular area as critical habitat." This section grants the Secretary [of Interior] to exclude any area from critical habitat if (s)he determines "the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat". The Secretary's discretion is limited, as (s)he may not exclude areas if so doing "will result in the extinction of the species."

169. Three types of small entities are defined in the RFA:

- Small Business - Section 601(3) of the RFA defines a small business as having the same meaning as small business concern under section 3 of the Small Business Act. This includes any firm that is independently owned and operated and is not dominant in its field of operation. The U.S. Small Business Administration (SBA) has developed size standards to carry out the purposes of the Small Business Act, and those size standards can be found in 13 CFR 121.201. The size standards are matched to North American Industry Classification System (NAICS) industries. The SBA definition of a small business applies to a firm’s parent company and all affiliates as a single entity.
- Small Governmental Jurisdiction - Section 601(5) defines small governmental jurisdictions as governments of cities, counties, towns, townships, villages, school districts, or special districts with a population of less than 50,000. Special districts may include those servicing irrigation, ports, parks and recreation, sanitation, drainage, soil and water conservation, road assessment, etc. When counties have populations greater than 50,000, those municipalities of fewer than 50,000 can be identified using population reports. Other types of small government entities are not as easily identified under this standard, as they are not typically classified by population.
- Small Organization - Section 601(4) defines a small organization as any not-for-profit enterprise that is independently owned and operated and not dominant in its

field. Small organizations may include private hospitals, educational institutions, irrigation districts, public utilities, agricultural co-ops, etc.

170. The courts have held that the RFA/SBREFA requires Federal agencies to perform a regulatory flexibility analysis of forecast impacts to small entities that are directly regulated. In the case of *Mid-Tex Electric Cooperative, Inc., v. Federal Energy Regulatory Commission (FERC),* FERC proposed regulations affecting the manner in which generating utilities incorporated construction work in progress in their rates. The generating utilities expected to be regulated were large businesses; however, their customers -- transmitting utilities such as electric cooperatives -- included numerous small entities. In this case, the court agreed that FERC simply authorized large electric generators to pass these costs through to their transmitting and retail utility customers, and FERC could therefore certify that small entities were not directly affected within the definition of the RFA.[82]

171. Similarly, *American Trucking Associations, Inc. v. Environmental Protection Agency* (EPA) addressed a rulemaking in which EPA established a primary national ambient air quality standard for ozone and particulate matter.[83] The basis of EPA's RFA/SBREFA certification was that this standard did not directly regulate small entities; instead, small entities were indirectly regulated through the implementation of State plans that incorporated the standards. The court found that, while EPA imposed regulation on States, it did not have authority under this rule to impose regulations directly on small entities and therefore small entities were not directly affected within the definition of the RFA.

172. The Small Business Administration (SBA) in its guidance on how to comply with the RFA recognizes that consideration of indirectly affected small entities is not required by the RFA, but encourages agencies to perform a regulatory flexibility analysis even when the impacts of its regulation are indirect.[84] "If an agency can accomplish its statutory mission in a more cost-effective manner, the Office of Advocacy [of the SBA] believes that it is good public policy to do so. The only way an agency can determine this is if it does not certify regulations that it knows will have a significant impact on small entities even if the small entities are regulated by a delegation of authority from the Federal agency to some other governing body."[85]

173. The regulatory mechanism through which critical habitat protections are enforced is Section 7 of the Act, which directly regulates only those activities carried out, funded, or permitted by a Federal agency. By definition, Federal agencies are not considered small entities, although the activities they fund or permit may be proposed or carried out by small entities. Given the SBA guidance described above, this screening analysis

[82] 773 F. 2d 327 (D.C. Cir. 1985).

[83] 175 F. 3d 1027, 1044 (D.C. Cir. 1999).

[84] Small Business Administration, Office of Advocacy. May 2003. A Guide for Government Agencies: How to Comply with the Regulatory Flexibility Act. pg. 20.

[85] *Ibid.*, pg. 21.

considers the extent to which this designation could potentially affect small entities, regardless of whether these entities would be directly regulated by the Service through the proposed rule or by a delegation of impact from the directly regulated entity. The small entities described in this appendix are not considered to be directly regulated by the Service through Section 7.

174. This screening analysis focuses on small entities that may bear the impacts quantified in Chapters 3 through 6 of this economic analysis. Although indirectly affected businesses are considered, this analysis considers only those entities whose impact would not be measurably diluted. Of the three affected activities discussed in the economic analysis, 1) timber management, 2) development, and 3) recreation and activities, this analysis describes that only impacts to timber management activities may be borne in part by small entities.

175. Impacts are not expected to small entities in other economic sectors potentially affected by this rule for the following reasons:

- Development – This analysis does quantifies the full option value for development within the areas proposed for final critical habitat. As described in Section 5, as the study area is characterized by rural, old-growth forest, development pressure is limited. Decreased land value associated with precluding future development of the area is forecast to be borne by the current landowners, which are either large timber companies, or residential landowner, not considered small entities.
- Recreation - Impacts to recreation activity forecast in Section 6 of this report include welfare impacts to individual hikers and recreators. As a result of potential restrictions on development of new trails and campgrounds, the high-end impacts quantified in this analysis result from lost opportunities for recreation on future trail expansions. The quantified welfare impacts are expected to be borne by individual recreators and impacts to small entities are not anticipated.

176. The category of impacts for which impacts of murrelet conservation may be borne by small businesses is timber management. Impacts to timber activities quantified in Section 4 of this report are predominantly decreased land values associated with precluding timber harvest in areas proposed for final critical habitat for the murrelet. These impacts are expected to be borne by the current landowners at the time of final critical habitat designation.

177. The land managed for timber harvest in areas proposed for final critical habitat is primarily (66 percent) publicly owned by States and Counties that are not small entities. The remaining 34 percent of timberlands are privately owned by timber companies and individuals. The largest land holders that actively manage for timber are: the Oregon Department of Forestry (81,310 acres), Weyerhaeuser (9,760 acres), and Big Creek Lumber Co. (6,116 Acres). Together, these three landowners account for 78 percent of

the timber ownership in the areas proposed for final critical habitat. None of these entities is considered small.[86]

178. Six units proposed for final critical habitat contain timberlands that may be owned by small timber companies: Units 1, 2, 3, 4, 13, and 14. Exhibit B-1 provides county-level information on the annual revenue generated from timberlands harvest, and percent of timberlands assigned to areas proposed for final critical habitat by Unit. Note that this table includes revenue generated by public timberlands in the counties as the isolated revenues of private timber companies are not available.

179. This exhibit highlights that this analysis estimates that only 1.7 percent of the total timberland in the counties containing areas proposed for final critical habitat may be affected by murrelet conservation. San Mateo County in California (Unit 14) has the most acres in areas proposed for final critical habitat as a percentage of total timberland acres; specifically, 20.7 percent of San Mateo timberlands are proposed for final critical habitat. San Mateo, however, has few active timberland acres countywide and timber is a marginal industry in the county (employment in the timber industry in San Mateo County is too small to even register in census statistics). Further, the primary timber landowner in San Mateo County is Big Creek Lumber Company, which, as mentioned above, is not a small business.

[86] Weyerhaeuser Company. "Seizing the Future; Weyerhaeuser Company, 2006 Annual Report and Form 10-K". 2006. Accessed at http://media.corporate-ir.net/media_files/irol/92/92287/reports/ 2006AnnualReportForm10K.pdf; Canlen, Brae. "Big Creek is a stand-alone lumber distribution channel - Brief Article". Home Channel News. 2001. Accessed at http://findarticles.com/p/articles/mi_m0VCW/is_3_27/ai_70740786.

EXHIBIT B-1 TIMBER INDUSTRY STATISTICS BY COUNTY

UNIT	COUNTY	VALUE OF HARVESTED ACRES	ESTIMATED TIMBERLAND ACRES BY COUNTY	TIMBERLAND ACRES PROPOSED FOR FINAL CRITICAL HABITAT	PERCENT OF PROPOSED ACRES TO TOTAL HARVESTABLE ACRES
1	Grays Harbor	$119,221,682	929,000	1,584	0.17%
2	Lewis	$134,040,745	794,000	940	0.12%
	Skagit	$29,475,989	381,000	1,228	0.32%
3	Grays Harbor	$119,221,682	929,000	5,598	0.60%
	Pacific	$68,460,195	505,000	13,090	2.59%
	Wahkiakum	$21,776,773	128,000	1,699	1.33%
4	Clatsop	$19,312,820	460,000	26,516	5.76%
	Tillamook	$10,140,265	617,000	43,089	6.98%
13	Mendocino	$40,995,090	854,000	1,043	0.12%
14	Santa Cruz	$1,802,958	155,000	4,741	3.06%
	San Mateo	$5,811,351	55,000	11,367	20.67%
	Totals:	**$586,847,258**	**7,202,700**	**123,816**	**1.72%**

Sources:

Washington Department of Natural Resources, "Timber Harvest By Ownership By County, 2001" Accessed at http://www.ofm.wa.gov/databook/pdf/lt02.pdf on March 2, 2007; Andrews, Alicia and Kutara Kristin, Oregon Department of Forestry, "Oregon's Timber Harvests 1849-2004", Accessed at http://www.oregon.gov/ODF/STATE_FORESTS/FRP/docs/OregonsTimberHarvests.pdf on March 2, 2007; California State Board of Equalization, "California Timber Harvest By County, 2004", Accessed at http://www.boe.ca.gov/proptaxes/pdf/yr3694to04.pdf on March 2, 2007.

State of Washington Department of Revenue, "Forest Excise Tax Distribution for Fourth Quarter, 2001", Accessed at http://dor.wa.gov/content/taxes/timber/forst_statco.aspx on March 6, 2007; Oregon Department of Forestry, "2004 Revenue Distribution to Oregon Counties", Acessed from at http://www.oregon.gov/ODF/STATE_FORESTS/FRP/2004Payments.shtml#Timber_Related_Returns_by_County on March 6, 2007; California State Board of Equalization, "California Timber Harvest By County, 2004", Accessed at http://www.boe.ca.gov/proptaxes/pdf/yr3694to04.pdf on March 6, 2007.

For WA only, 4% of all timber revenue generated on private lands goes to the county in which it was harvested. By using the annual excise tax values for 2001, the total value for harvested acres could be calculated.

Gray, Andrew N.; Veneklase, Charles F.; Rhoads, Robert D. 2005. Timber resource statistics for non-national forest land in western Washington, 2001. Resour. Bull. PNW-RB-246. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 117 p.; Azuma, David L.; Bednar, Larry F.; Hiserote, Bruce A.; Veneklase, Charles F. 2004. Timber resource statistics for western Oregon, 1997. Rev. Resour. Bull. PNWRB- 237. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 120 p.; Counting California, "Area Of Timberland And Ownerships In California, 2002" Accessed at http://countingcalifornia.cdlib.org/matrix/c71.html on March 7, 2007.

180. Approximately seven percent of Tillamook County, Oregon timberlands and 5.8 percent of Clatsop County, Oregon timberlands are also proposed for final critical habitat. Less than three percent of timberlands in each of the remaining counties is proposed for final critical habitat for the murrelet. Because murrelet conservation may affect the greatest percentage of timberland in the counties of San Mateo, Tillamook, and Clatsop, Exhibit B-2 describes the number of small timber tract operations within those counties.

EXHIBIT B-2 SMALL BUSINESSES THAT MAY BE AFFECTED BY MURRELET CONSERVATION

NAICS CODE / INDUSTRY	SMALL BUSINESS SIZE STANDARD		COUNTY				
			Clat-sop	Tilla-mook	San Mateo	TOTAL	% SMALL
113110: Timber Tract Operations	$6,500,000	Total	3	0	1	4	
		Small	2	0	1	3	75%
NOTE: Size standard based on SBA's Table of Small Business Size Standards based on NAICS 2002 (http://www.sba.gov/size/sizetable2002.pdf). Numbers of businesses are based on Dun and Bradstreet Business Information downloaded March 2007.							

181. According to Dun and Bradstreet business information, there are few timber tract operations within these counties. This is in part explained by the large quantity of State and county timberlands within this region. Further, individual residents own timberlands in this region and may not register as businesses in available statistics. Regardless, of the known timber companies within this region, the majority (75 percent) are small.

182. Information is not available on the total acreage of timberland by each landowner potentially affected by murrelet conservation. This screening analysis is therefore unable to provide information regarding the economic impact of murrelet conservation (decreased land value) as a percentage of total revenue per business. Exhibit B-3 does, however, provide information on the present value impacts expected to be borne by private timber landowners within the areas proposed for final critical habitat. As noted above, however, the major private timber landowners are not small businesses (e.g., Weyerhaeuser and Big Creek Lumber Company).

183. Exhibit B-1 describes that the potentially affected timber acres are few relative to the total timberland area in the counties containing areas proposed for final critical habitat. As a result, regional businesses that support or are supported by the timber companies (e.g., sawmills and logging operations), are not expected to be measurably affected by murrelet conservation.

EXHIBIT B-3 ESTIMATED HIGH-END IMPACTS OF MURRELET CONSERVATION ON PRIVATE TIMBER LANDOWNERS

UNIT	TOTAL IMPACTS (PRESENT VALUE 7%)	TOTAL IMPACTS (PRESENT VALUE 3%)
1	$3,970,000	$10,100,000
2	$4,550,000	$11,300,000
3	$49,500,000	$126,000,000
4	$796,000	$1,900,000
13	$5,560,000	$15,100,000
14	$9,990,000	$51,800,000

B.2 POTENTIAL IMPACTS TO THE ENERGY INDUSTRY

184. Pursuant to Executive Order No. 13211, "Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use," issued May 18, 2001, Federal agencies must prepare and submit a "Statement of Energy Effects" for all "significant energy actions." The purpose of this requirement is to ensure that all Federal agencies "appropriately weigh and consider the effects of the Federal Government's regulations on the supply, distribution, and use of energy."[87]

185. The Office of Management and Budget provides guidance for implementing this Executive Order, outlining nine outcomes that may constitute "a significant adverse effect" when compared with the regulatory action under consideration:

- Reductions in crude oil supply in excess of 10,000 barrels per day (bbls);
- Reductions in fuel production in excess of 4,000 barrels per day;
- Reductions in coal production in excess of 5 million tons per year;
- Reductions in natural gas production in excess of 25 million Mcf per year;
- Reductions in electricity production in excess of 1 billion kilowatts-hours per year or in excess of 500 megawatts of installed capacity;
- Increases in energy use required by the regulatory action that exceed the thresholds above;
- Increases in the cost of energy production in excess of one percent;
- Increases in the cost of energy distribution in excess of one percent; or
- Other similarly adverse outcomes.[88]

[87] Memorandum For Heads of Executive Department Agencies, and Independent Regulatory Agencies, Guidance For Implementing E.O. 13211, M-01-27, Office of Management and Budget, July 13, 2001, http://www.whitehouse.gov/omb/memoranda/m01-27.html.

[88] Ibid.

As none of these criteria is relevant to this analysis, energy-related impacts associated with conservation efforts within the potential critical habitat are not expected.

APPENDIX C | DETAILED UNIT BY UNIT IMPACTS

APPENDIX C-1. ESTIMATED IMPACTS IN AREAS PROPOSED FOR EXCLUSION ACCORDING TO SECTION 4(B)(2)

		Pre-designation Impacts						Future Costs									
		Undiscounted Dollars		Present Value 3%		Present Value 7%		Undiscounted Dollars		Present Value 3%		Present Value 7%		Annualized 3%		Annualized 7%	
Critical Habitat Units	Subunit	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
1- Northwest Washington	US Forest Service	$14,700,000	$14,700,000	$17,300,000	$17,300,000	$21,600,000	$21,600,000	$143,000,000	$143,000,000	$48,400,000	$48,400,000	$21,100,000	$21,100,000	$1,490,000	$1,490,000	$1,490,000	$1,490,000
	WA DNR	$7,950,000	$7,950,000	$9,380,000	$9,380,000	$11,700,000	$11,700,000	$77,000,000	$77,000,000	$26,000,000	$26,000,000	$11,300,000	$11,300,000	$800,000	$800,000	$802,000	$802,000
	Makah Nation	$42,300	$42,300	$48,400	$48,400	$57,900	$57,900	$513,000	$513,000	$173,000	$173,000	$75,300	$75,300	$5,330	$5,330	$5,340	$5,340
2 - Washington Cascades	US Forest Service	$28,200,000	$28,200,000	$33,300,000	$33,300,000	$41,600,000	$41,600,000	$276,000,000	$276,000,000	$93,200,000	$93,200,000	$40,600,000	$40,600,000	$2,870,000	$2,870,000	$2,880,000	$2,880,000
	WA DNR	$3,540,000	$3,540,000	$4,180,000	$4,180,000	$5,230,000	$5,230,000	$34,300,000	$34,300,000	$11,600,000	$11,600,000	$5,040,000	$5,040,000	$356,000	$356,000	$357,000	$357,000
3 - Southwestern Washington	U.S. Fish and Wildlife Service	$9,200	$9,200	$10,900	$10,900	$13,600	$13,600	$18,400	$18,400	$14,100	$14,100	$10,400	$10,400	$947	$947	$984	$984
	WA DNR	$3,040,000	$3,040,000	$3,590,000	$3,590,000	$4,490,000	$4,490,000	$29,500,000	$29,500,000	$9,940,000	$9,940,000	$4,330,000	$4,330,000	$306,000	$306,000	$302,000	$302,000
	The Nature Conservancy	$9,900	$9,900	$11,700	$11,700	$14,600	$14,600	$19,800	$19,800	$15,200	$15,200	$11,200	$11,200	$758	$758	$754	$754
4 - Northwest Oregon	US Forest Service	$305,000	$305,000	$359,000	$359,000	$449,000	$449,000	$2,980,000	$2,980,000	$1,010,000	$1,010,000	$438,000	$438,000	$31,000	$31,000	$31,000	$31,000
5 - Hebo	US Forest Service	$6,530,000	$6,530,000	$7,700,000	$7,700,000	$9,630,000	$9,630,000	$63,900,000	$63,900,000	$21,600,000	$21,600,000	$9,380,000	$9,380,000	$664,000	$664,000	$665,000	$665,000
6 - Yaquina	US Forest Service	$96,500	$96,500	$6,870	$6,870	$142,000	$142,000	$943,000	$943,000	$318,000	$318,000	$139,000	$139,000	$9,810	$9,810	$9,820	$9,820
7 - Central Oregon	U.S. Forest Service	$23,100,000	$23,100,000	$27,200,000	$27,200,000	$34,000,000	$34,000,000	$226,000,000	$226,000,000	$76,100,000	$76,100,000	$33,100,000	$33,100,000	$2,340,000	$2,340,000	$2,350,000	$2,350,000
	State of Oregon	$4,190	$4,190	$4,940	$4,940	$6,190	$6,190	$41,800	$41,800	$14,000	$14,000	$6,010	$6,010	$421	$421	$421	$421
8 - Elliot	U.S. Forest Service	$16,500	$16,500	$19,400	$19,400	$24,300	$24,300	$161,000	$161,000	$54,400	$54,400	$23,700	$23,700	$1,680	$1,680	$1,680	$1,680
	State of Oregon	$3,140,000	$3,140,000	$3,710,000	$3,710,000	$4,640,000	$4,640,000	$31,400,000	$31,400,000	$10,500,000	$10,500,000	$4,510,000	$4,510,000	$316,000	$316,000	$316,000	$316,000
9 - Coquille	U.S. Forest Service	$2,910,000	$2,910,000	$3,430,000	$3,430,000	$4,290,000	$4,290,000	$28,500,000	$28,500,000	$9,600,000	$9,600,000	$4,180,000	$4,180,000	$296,000	$296,000	$296,000	$296,000
10 - Southwestern Oregon	U.S. Forest Service	$13,100,000	$13,100,000	$15,500,000	$15,500,000	$19,300,000	$19,300,000	$128,000,000	$128,000,000	$43,300,000	$43,300,000	$18,800,000	$18,800,000	$1,330,000	$1,330,000	$1,340,000	$1,340,000
11 - Del Norte/Northern Humbolt County	U.S. Bureau of Land Management	$8,780,000	$8,780,000	$10,400,000	$10,400,000	$12,900,000	$12,900,000	$1,780,000	$1,780,000	$601,000	$601,000	$262,000	$262,000	$18,500	$18,500	$18,500	$18,500
	U.S. Forest Service	$182,000	$182,000	$215,000	$215,000	$268,000	$268,000	$85,800,000	$85,800,000	$29,000,000	$29,000,000	$12,600,000	$12,600,000	$892,000	$892,000	$894,000	$894,000
12 - Southern Humbolt County	Private	$1,480,000	$1,480,000	$1,720,000	$1,720,000	$2,100,000	$2,100,000	$2,620,000	$2,620,000	$1,140,000	$1,140,000	$713,000	$713,000	$38,600	$38,600	$49,300	$49,300
13 - Mendicino County	U.S. Bureau of Land Management	$1,290,000	$1,290,000	$1,530,000	$1,530,000	$1,910,000	$1,910,000	$12,700,000	$12,700,000	$4,270,000	$4,270,000	$1,860,000	$1,860,000	$132,000	$132,000	$132,000	$132,000
Multiple (Administrative Costs)		$41,915,123	$41,915,123	$41,915,123	$41,915,123	$41,915,123	$41,915,123	$65,212,836	$65,212,836	$48,510,580	$48,510,580	$34,543,120	$34,543,120	$2,321,800	$2,321,800	$2,321,800	$2,321,800
Total		$160,387,378	$160,387,378	$181,486,513	$181,486,513	$216,437,415	$216,437,415	$1,210,596,193	$1,210,596,193	$435,187,796	$435,187,796	$203,025,614	$203,025,614	$14,229,986	$14,229,986	$14,257,715	$14,257,715

APPENDIX C-2. ESTIMATED IMPACTS TO ALL ACTIVITIES IN AREAS PROPOSED FOR FINAL CRITICAL HABITAT

		Pre-designation Impacts						Future Costs									
		Undiscounted Dollars		Present Value 3%		Present Value 7%		Undiscounted Dollars		Present Value 3%		Present Value 7%		Annualized 3%		Annualized 7%	
Critical Habitat Units	Subunit	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
1- Northwest Washington	Private	$0	$0	$0	$0	$0	$0	$0	$26,500,000	$0	$12,200,000	$0	$6,110,000	$0	$366,000	$0	$428,000
2 - Washington Cascades	Private	$0	$0	$0	$0	$0	$0	$0	$27,700,000	$0	$11,300,000	$0	$4,550,000	$0	$339,000	$0	$318,000
	Lummi Nation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	The Nature Conservancy	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Co-Owned Lummi/TNC	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3 - Southwestern Washington	Private	$0	$0	$0	$0	$0	$0	$7,210,000	$320,000,000	$5,520,000	$135,000,000	$4,080,000	$58,500,000	$371,000	$4,060,000	$386,000	$4,090,000
	Grays Harbor County	$78,500	$78,500	$82,700	$82,700	$88,600	$88,600	$314,000	$24,100,000	$240,000	$9,940,000	$178,000	$3,920,000	$16,200	$298,000	$16,800	$275,000
	WA State Parks and Rec	$1,660	$1,660	$1,930	$1,930	$2,330	$2,330	$21,400	$2,610,000	$19,600	$1,960,000	$17,700	$1,420,000	$1,310	$132,000	$1,670	$134,000
	US BLM	$5,340	$5,340	$6,190	$6,190	$7,480	$7,480	$68,600	$8,360,000	$62,700	$6,290,000	$56,700	$4,560,000	$4,220	$423,000	$5,350	$430,000
4 - Northwest Oregon	Private	$0	$0	$0	$0	$0	$0	$0	$4,480,000	$0	$1,900,000	$0	$796,000	$0	$57,100	$0	$55,700
	OR Dept of Forestry	$11,400,000	$11,400,000	$14,400,000	$14,400,000	$20,000,000	$20,000,000	$17,800,000	$660,000,000	$13,600,000	$220,000,000	$10,100,000	$94,300,000	$917,000	$6,600,000	$952,000	$706,000
5 - Hebo	OR Dept of Forestry	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
6 - Yaquina	OR Dept of Forestry	$398,000	$398,000	$494,000	$494,000	$413,000	$413,000	$749,000	$21,000,000	$574,000	$6,990,000	$425,000	$3,000,000	$38,600	$210,000	$40,100	$210,000
11 - Del Norte/Northern Humbolt County	Private	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
12 - Southern Humbolt County	CA Dept of Game and Fish	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	CA Dept of Parks and Rec	$0	$0	$0	$0	$0	$0	$690,000	$690,000	$528,000	$528,000	$391,000	$391,000	$35,500	$35,500	$36,900	$36,900
	Humboldt County	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
13 - Mendicino County	Private	$0	$0	$0	$0	$0	$0	$6,580,000	$48,200,000	$5,040,000	$15,100,000	$3,730,000	$5,560,000	$339,000	$454,000	$352,000	$389,000
	CA Dept of Parks and Rec	$12,000	$12,000	$15,300	$15,300	$21,500	$21,500	$200,000	$200,000	$153,000	$153,000	$113,000	$113,000	$10,300	$10,300	$10,700	$10,700
	CA Dept of Forestry	$0	$0	$0	$0	$0	$0	$12,500	$3,210,000	$7,560	$876,000	$3,960	$180,000	$508	$26,300	$374	$12,600
14 - Santa Cruz Mountains	Private	$912,000	$912,000	$1,200,000	$1,200,000	$931,000	$931,000	$30,600,000	$260,000,000	$8,400,000	$101,000,000	$2,280,000	$58,700,000	$287,000	$3,020,000	$177,000	$4,110,000
	CA Dept of Parks and Rec	$500,000	$500,000	$639,000	$639,000	$896,000	$896,000	$600,000	$600,000	$460,000	$460,000	$340,000	$340,000	$30,900	$30,900	$32,100	$32,100
	San Mateo County	$130,000	$130,000	$134,000	$134,000	$139,000	$139,000	$130,000	$10,300,000	$99,600	$7,920,000	$73,700	$5,860,000	$6,700	$532,000	$6,960	$553,000
	City Lands	$56,800	$56,800	$61,600	$61,600	$68,500	$68,500	$252,000	$252,000	$192,000	$192,000	$140,000	$140,000	$12,900	$12,900	$13,200	$13,200
	Regional Open Space	$15,000	$20,000	$15,500	$20,600	$16,100	$21,400	$40,000	$40,000	$38,800	$38,800	$37,400	$37,400	$2,610	$2,610	$3,530	$3,530
Multiple (Administrative Costs)		$2,680,000	$2,680,000	$2,680,000	$2,680,000	$2,680,000	$2,680,000	$4,160,000	$4,160,000	$3,100,000	$3,100,000	$2,200,000	$2,200,000	$148,000	$148,000	$148,000	$148,000
Total		$16,200,000	$16,300,000	$19,800,000	$19,800,000	$25,200,000	$25,300,000	$69,400,000	$1,420,000,000	$38,100,000	$535,000,000	$24,200,000	$251,000,000	$2,220,000	$16,800,000	$2,180,000	$12,000,000

APPENDIX C-3. ESTIMATED IMPACTS TO TIMBER MANAGEMENT IN AREAS PROPOSED FOR FINAL CRITICAL HABITAT

		Pre-designation Impacts						Future Costs									
		Undiscounted Dollars		Present Value 3%		Present Value 7%		Undiscounted Dollars		Present Value 3%		Present Value 7%		Annualized 3%		Annualized 7%	
Critical Habitat Units	Subunit	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
1- Northwest Washington	Private	$0	$0	$0	$0	$0	$0	$0	$24,400,000	$0	$10,100,000	$0	$3,970,000	$0	$302,000	$0	$278,000
2 - Washington Cascades	Private	$26,000	$26,000	$31,300	$31,300	$29,400	$29,400	$0	$27,700,000	$0	$11,300,000	$0	$4,550,000	$0	$339,000	$0	$318,000
	Lummi Nation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	The Nature Conservancy	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Co-Owned Lummi/TNC	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3 - Southwestern Washington	Private	$0	$0	$0	$0	$0	$0	$7,210,000	$311,000,000	$5,520,000	$126,000,000	$4,080,000	$49,500,000	$371,000	$3,790,000	$386,000	$3,470,000
	Grays Harbor County	$78,500	$78,500	$82,700	$82,700	$88,600	$88,600	$314,000	$24,100,000	$240,000	$9,940,000	$178,000	$3,920,000	$16,200	$298,000	$16,800	$275,000
	WA State Parks and Rec	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	US BLM	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4 - Northwest Oregon	Private	$0	$0	$0	$0	$0	$0	$0	$4,480,000	$0	$1,900,000	$0	$796,000	$0	$57,100	$0	$55,700
	OR Dept of Forestry	$11,400,000	$11,400,000	$14,400,000	$14,400,000	$20,000,000	$20,000,000	$17,800,000	$660,000,000	$13,600,000	$220,000,000	$10,100,000	$94,300,000	$917,000	$6,600,000	$952,000	$706,000
5 - Hebo	OR Dept of Forestry	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
6 - Yaquina	OR Dept of Forestry	$398,000	$398,000	$494,000	$494,000	$413,000	$413,000	$749,000	$21,000,000	$574,000	$6,990,000	$425,000	$3,000,000	$38,600	$210,000	$40,100	$210,000
11 - Del Norte/Northern Humbolt County	Private	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
12 - Southern Humbolt County	CA Dept of Game and Fish	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	CA Dept of Parks and Rec	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Humboldt County	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
13 - Mendicino County	Private	$0	$0	$0	$0	$0	$0	$6,580,000	$48,200,000	$5,040,000	$15,100,000	$3,730,000	$5,560,000	$339,000	$454,000	$352,000	$389,000
	CA Dept of Parks and Rec	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	CA Dept of Forestry	$0	$0	$0	$0	$0	$0	$12,500	$3,210,000	$7,560	$876,000	$3,960	$180,000	$508	$26,300	$374	$12,600
14 - Santa Cruz Mountains	Private	$912,000	$912,000	$1,200,000	$1,200,000	$931,000	$931,000	$30,600,000	$211,000,000	$8,400,000	$51,800,000	$2,280,000	$9,990,000	$287,000	$1,550,000	$177,000	$699,000
	CA Dept of Parks and Rec	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	San Mateo County	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	City Lands	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Regional Open Space	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total		$12,800,000	$12,800,000	$16,200,000	$16,200,000	$21,400,000	$21,400,000	$63,300,000	$1,340,000,000	$33,400,000	$454,000,000	$20,800,000	$176,000,000	$1,970,000	$13,600,000	$1,920,000	$6,410,000

APPENDIX C-4. ESTIMATED IMPACTS TO DEVELOPMENT ACTIVITIES IN AREAS PROPOSED FOR FINAL CRITICAL HABITAT

		Pre-designation Impacts						Future Costs									
		Undiscounted Dollars		Present Value 3%		Present Value 7%		Undiscounted Dollars		Present Value 3%		Present Value 7%		Annualized 3%		Annualized 7%	
Critical Habitat Units	Subunit	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
1- Northwest Washington	Private	$0	$0	$0	$0	$0	$0	$0	$2,140,000	$0	$2,140,000	$0	$2,140,000	$0	$64,300	$0	$150,000
2 - Washington Cascades	Private	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Lummi Nation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	The Nature Conservancy	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Co-Owned Lummi/TNC	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3 - Southwestern Washington	Private	$0	$0	$0	$0	$0	$0	$0	$8,930,000	$0	$8,930,000	$0	$8,930,000	$0	$268,000	$0	$625,000
	Grays Harbor County	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	WA State Parks and Rec	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	US BLM	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4 - Northwest Oregon	Private	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	OR Dept of Forestry	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
5 - Hebo	OR Dept of Forestry	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
6 - Yaquina	OR Dept of Forestry	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
11 - Del Norte/Northern Humbolt County	Private	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
12 - Southern Humbolt County	CA Dept of Game and Fish	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	CA Dept of Parks and Rec	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Humboldt County	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
13 - Mendicino County	Private	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	CA Dept of Parks and Rec	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	CA Dept of Forestry	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
14 - Santa Cruz Mountains	Private	$0	$0	$0	$0	$0	$0	$0	$48,700,000	$0	$48,700,000	$0	$48,700,000	$0	$1,460,000	$0	$3,410,000
	CA Dept of Parks and Rec	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	San Mateo County	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	City Lands	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Regional Open Space	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total		$0	$0	$0	$0	$0	$0	$0	$59,800,000	$0	$59,800,000	$0	$59,800,000	$0	$1,790,000	$0	$4,190,000

APPENDIX C-5. ESTIMATED IMPACTS TO RECREATION ACTIVITIES IN AREAS PROPOSED FOR FINAL CRITICAL HABITAT

		Pre-designation Impacts						Future Costs									
		Undiscounted Dollars		Present Value 3%		Present Value 7%		Undiscounted Dollars		Present Value 3%		Present Value 7%		Annualized 3%		Annualized 7%	
Critical Habitat Units	Subunit	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
1- Northwest Washington	Private	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2 - Washington Cascades	Private	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Lummi Nation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	The Nature Conservancy	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Co-Owned Lummi/TNC	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3 - Southwestern Washington	Private	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Grays Harbor County	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	WA State Parks and Rec	$1,660	$1,660	$1,930	$1,930	$2,330	$2,330	$21,400	$2,610,000	$19,600	$1,960,000	$17,700	$1,420,000	$1,310	$132,000	$1,670	$134,000
	US BLM	$5,340	$5,340	$6,190	$6,190	$7,480	$7,480	$68,600	$8,360,000	$62,700	$6,290,000	$56,700	$4,560,000	$4,220	$423,000	$5,350	$430,000
4 - Northwest Oregon	Private	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	OR Dept of Forestry	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
5 - Hebo	OR Dept of Forestry	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
6 - Yaquina	OR Dept of Forestry	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
11 - Del Norte/Northern Humbolt County	Private	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
12 - Southern Humbolt County	CA Dept of Game and Fish	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	CA Dept of Parks and Rec	$0	$0	$0	$0	$0	$0	$689,500	$689,500	$528,288	$528,288	$390,795	$390,795	$35,509	$35,509	$36,888	$36,888
	Humboldt County	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
13 - Mendicino County	Private	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	CA Dept of Parks and Rec	$12,000	$12,000	$15,300	$15,300	$21,500	$21,500	$200,000	$200,000	$153,000	$153,000	$113,000	$113,000	$10,300	$10,300	$10,700	$10,700
	CA Dept of Forestry	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
14 - Santa Cruz Mountains	Private	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	CA Dept of Parks and Rec	$500,000	$500,000	$639,000	$639,000	$896,000	$896,000	$600,000	$600,000	$460,000	$460,000	$340,000	$340,000	$30,900	$30,900	$32,100	$32,100
	San Mateo County	$130,000	$130,000	$134,000	$134,000	$139,000	$139,000	$130,000	$10,300,000	$99,600	$7,920,000	$73,700	$5,860,000	$6,700	$532,000	$6,960	$553,000
	City Lands	$56,800	$56,800	$61,600	$61,600	$68,500	$68,500	$252,000	$252,000	$192,000	$192,000	$140,000	$140,000	$12,900	$12,900	$13,200	$13,200
	Regional Open Space	$15,000	$20,000	$15,500	$20,600	$16,100	$21,400	$40,000	$40,000	$38,800	$38,800	$37,400	$37,400	$2,610	$2,610	$3,530	$3,530
Total		$721,000	$726,000	$873,000	$878,000	$1,150,000	$1,160,000	$2,000,000	$23,100,000	$1,550,000	$17,500,000	$1,170,000	$12,900,000	$104,000	$1,180,000	$110,000	$1,210,000

APPENDIX C-6. ESTIMATED ADMINISTRATIVE COSTS OF CONSULTATION IN AREAS PROPOSED FOR FINAL CRITICAL HABITAT

Critical Habitat Units	Subunit	Pre-designation Impacts						Future Costs									
		Undiscounted Dollars		Present Value 3%		Present Value 7%		Undiscounted Dollars		Present Value 3%		Present Value 7%		Annualized 3%		Annualized 7%	
		Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Multiple		$2,680,000	$2,680,000	$2,680,000	$2,680,000	$2,680,000	$2,680,000	$4,160,000	$4,160,000	$3,100,000	$3,100,000	$2,200,000	$2,200,000	$148,000	$148,000	$148,000	$148,000
Total		$2,680,000	$2,680,000	$2,680,000	$2,680,000	$2,680,000	$2,680,000	$4,160,000	$4,160,000	$3,100,000	$3,100,000	$2,200,000	$2,200,000	$148,000	$148,000	$148,000	$148,000

APPENDIX D | IMPACTS TO TIMBER ACTIVITIES DISCOUNTED AT SIX PERCENT

186. This appendix presents impacts to timber land values as present value terms applying a discount rate of six percent. As described in Section 4 of this report, information about the value of harvestable timber and opportunity costs of capital to the timber industry (discount rates) is used to estimate current land values. Following the direction in OMB's Circular A-4 and direction provided by the Department of the Interior, this analysis applies three discount rates: three, seven, and zero (undiscounted) to calculate these land values, rather than the opportunity cost of capital specific to the timber industry. Personal communication with timberland appraisers in the Pacific Northwest, however, suggests that a more appropriate industry-specific opportunity cost of capital to apply is six percent. Regional timber appraisers generally apply discount rates between five and seven in the timber industry, while three is considered very low.[89] While six percent is within the range of three to seven percent and therefore present value impacts are described within the bounds of this analysis, this appendix quantifies the timber impacts assuming an industry and region specific discount rate of six percent for comparison.

[89] Personal communication with Toby Atterbury, Atterbury Consultants, Incorporated, on March 13, 2007.

EXHIBIT D-1 PRE- AND POST- DESIGNATION IMPACTS (PRESENT VALUE USING A SIX PERCENT DISCOUNT RATE)

UNIT	LANDOWNER TYPE	STATE	PRE-DESIGNATION IMACTS	POST-DESIGNATION IMPACTS		ANNUALIZED IMPACTS	
				SCENARIO 1	SCENARIO 2	SCENARIO 1	SCENARIO 2
1	Private Landowner	WA	$0	$0	$4,870,000	$0	$292,000
2	Private Landowner	WA	$0	$0	$5,530,000	$0	$332,000
3	County Lands	WA	$87,094	$4,380,000	$60,700,000	$371,000	$3,640,000
	Private Landowner	WA	$0	$191,000	$4,810,000	$16,600	$289,000
4	Private Landowner	OR	$0	$0	$963,000	$0	$57,800
	Various OR State Agencies	OR	$18,400,000	$10,800,000	$110,000,000	$943,000	$6,600,000
6	Various OR State Agencies	OR	$393,000	$455,000	$3,500,000	$39,700	$210,000
13	CA Dept. of Forestry and Fire Protection	CA	$0	$4,640	$217,000	$405	$13,000
	Private Landowner	CA	$0	$4,000,000	$6,520,000	$349,000	$391,000
14	Private Landowner	CA	$870,000	$2,620,000	$12,000,000	$178,000	$721,000
		Total:	**$19,700,000**	**$22,500,000**	**$209,000,000**	**$1,900,000**	**$12,600,000**